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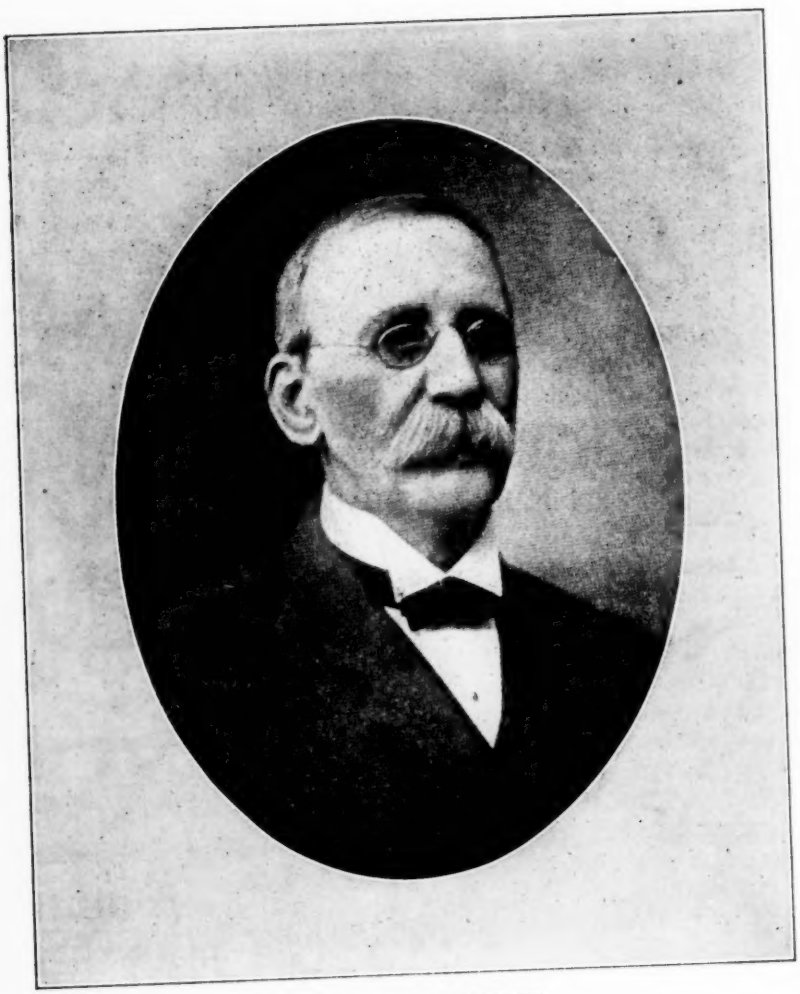
JOHN FRANCIS HANCOCK

BALTIMORE

Twenty-first President of the American Pharmaceutical Association

Chairman, William Procter, Jr., Memorial Monument Committee



JOHN FRANCIS HANCOCK

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. V AUGUST, 1916 NO. 8

JOHN FRANCIS HANCOCK.

The subject of this friendly, personal sketch dates his lineage back to 1664, when his ancestor, Stephen Hancock, came to St. Mary's, the first settlement in Maryland. The possessions obtained at that time have been in the Hancock family to the present generation; good stock it must have been, and has been well preserved in the person occupying our thought at this writing.

We do not desire to genealogize, but rather pay a tribute to one who is among the most distinguished members of our Pharmaceutical family. He commenced his career in a one-story log school-house, but unfortunately lost his father by death at the early age of fifteen years, and conditions prevented his attaining the educational ambition along the lines of classical education, as hoped for. He was early constrained to work his way as many others have had to do—possessed of the right sort of grit, availing every possible help for self-culture, of genial disposition and courage undaunted, a fixed purpose, a well balanced mind and sterling integrity. He won friends at every turn and in course landed in the Apothecary Shop of that day, and at the age of twenty-one became a partner in a business—since then, the name of Hancock in Pharmacy has had an unbroken line, from Landis & Hancock, John F. Hancock, and now John F. Hancock & Son.

He matriculated in the Maryland College of Pharmacy in 1857, and devoted his first opportunity to special study of chemistry. The next two years he was able to attend all the lectures in the three branches taught, and graduated in 1860. He became a member of the College in 1861, and soon thereafter was elected a member of the Board of Examiners. The degree of Master in Pharmacy was awarded by his College, and he served as president in 1872-1874. In 1907 the University of Maryland honored him with the degree of Doctor of Pharmacy, and in 1908 the Philadelphia College of Pharmacy awarded the degree of Master in Pharmacy. He became affiliated with the American Pharmaceutical Association in 1863, and was its president in 1873-1874. The records of this Association indicate valuable service. His life and career up to date are full of good work. His service in the interest of the Memorial Monument to William Procter, Jr., which, when finally placed, will also be a monument to his fidelity to the cause he has fathered and labored for with such persevering efficiency for over sixteen years.

He is a member of the Maryland Pharmaceutical Association, an honorary member of the Pennsylvania Pharmaceutical Association and a frequent visitor at its annual meetings, where he is at all times a welcome guest. He is a most genial, hospitable and affectionate friend. JOSEPH LYON LEMBERGER.

EDITORIAL

E. G EBERLE, Editor 253 Bourse Bldg., PHILADELPHIA

THE NINTH REVISION OF THE UNITED STATES PHARMACOPŒIA.

SEPTEMBER 1 has been named as the date when the Ninth Revision of the United States Pharmacopœia will become official. While the time intervening is a shorter period than obtained between the dates of publication and official designation of previous revisions, comparatively few additions were made to the materia medica of the Ninth Revision, and most of these are supplied by manufacturers and wholesalers. Wide publicity has been given to the changes made in the Pharmacopœia, so that everyone deeply interested should be informed, and it is safe to say that on September 1, drugs and preparations according to the U. S. P. IX will be obtainable. The fact is, that with very few exceptions, the drugs, chemicals and preparations that have been on the market conform to the standard. To some extent it may be necessary to modify the statement relative to drugs, but this is largely due to the unfortunate conditions that have obtained during the past two years; still it is safe to say that standardized drugs are obtainable, and the preparations of American manufacturers conform to the official requirements. Conclusively the pharmacists who recognize their responsibilities are now supplied with official materia medica. That there must and will be some allowance made, on account of the practical impossibility to supply everyone requiring a Pharmacopœia, is becoming very evident.

It is a remarkable fact that many pharmacists never read the introductory notices of the Pharmacopœia, nor give attention to Part II. In the present Revision, the latter contains very important matter and perhaps more of what is really new than Part I. Every pharmacist should devote study to both of the sections referred to—necessity will compel reference to the other portions of the book.

By looking over the list of additions and deletions and the tables of changes in standards, pharmacists will soon know whether their stock conforms, and what they must do in order to bring it to the requirements of the present Revision.

A number of titles have appended the capital letters P. I., an abbreviation signifying that the preparation or drug conforms to a standard or strength agreed upon by the Brussels Conference. As quite a number of reviews relating to the new Pharmacopœia have appeared, and one is in this issue of the JOURNAL, and also because reference is made in these papers to the International Protocol,[1] and for the further reason that several communications have reached the editorial office asking for information relative to this agreement, the conclusion has been reached to explain with some little detail the purpose of such international agreement.

[1] Applying deductions from the definition of the word, the Protocol may be defined as a document signed by authorized representatives of the governments entering into an agreement, whereby it is sought to secure uniform standards for materia medica.

The European war has very strongly emphasized that nations are interdependent. We obtain our supplies from every section of the world and hence must have knowledge of the crude and manufactured products in order to provide standards. The application may be extended by alluding to the fact that distances are only relative, and people of one country travel in the lands of another. For these reasons the making of a national pharmacopœia requires international coöperation.

The Protocol may be said to be the practical substitute for an international pharmacopœia. As one of the important results of the conference in the City of Brussels, September, 1902, the Eighth Revision of the United States Pharmacopœia adopted a 10 percent strength for the tinctures of potent drugs. It will be remembered that this meant quite a decided change in the strength of a number of tinctures, notably of Veratrum, Aconite and Strophanthus.

The title adopted by the international pharmaceutical congress is, Conference Internationale pour l' Unification de la Formule des Medicaments Heroiques, hence it will be seen that the prime object was simply to unify the strength of preparations of potent drugs. In order to do this, the very natural sequence was to standardize the drugs. There has been more or less deviation, and extension of the idea which called together this important committee. Commissioners in the Conference and signators to the agreement, Protocole Internationale, represented practically every European country and the United States. The agreement entered upon September 20, 1906, provided for certain uniform rules to be applied to potent remedies and then these were enumerated and defined. The statement shows the progress from preparations of drugs to the inclusion of standards for the latter. Mr. George M. Beringer in his paper points out the necessity for some changes or exceptions to the general rules of the Protocol. Before the Protocol was signed on the 29th day of November, 1906, reservations were made by several governments; the statement on the part of the United States was that by signing the agreement, no further duty was assumed than that of trying to bring the ninth revision of the United States Pharmacopœia into harmony with the propositions adopted.

Article 2 of the Protocol provides that wines shall not be made of potent medicinal substances. With this the U. S. P. IX has complied by excluding all medicated wines, and the same authority also observes the other two demands, namely, for 10 percent tinctures of potent drugs, and fluidextracts representing the drugs in the proportion that already obtained in the last Revision.

The Pharmacopœia has a table which gives information of relative strengths in the two standards, which makes such detailed reference here unnecessary. The suggestion of using 70 percent alcohol as a menstruum was not generally adopted for the very good reason that the same solvent is not advised for radically dissimilar drugs. The purposes of the Protocol having been stated and historical references briefly given, a few further remarks bearing on the Ninth Revision will conclude this comment.

Even now, it is more or less difficult to refer to important changes without

repeating what pharmacists have already said about the new standard, but we await with interest the expression of the medical press.

The Pharmacopœia provides standards and, in doing so, includes some descriptions and tests that are more particularly intended for manufacturers and importers. The descriptions of microscopic structure and characteristics of the powdered drugs, and some of the physical tests are important and valuable additions, which, while they may not be made use of by many pharmacists in the conduct of their business, represent the advanced thought and embody the latest methods of standardization and examination. The usefulness of the Pharmacopœia has been largely enhanced by the additions and improvements of Part II. The information supplied there should give the book a more extended use in the laboratories of medical and pharmaceutical schools; the inclusion of explanatory remarks and instruction in the details of manipulations really adds text-book value to the Pharmacopœia. E. G. E.

THE NATIONAL FORMULARY, FOURTH EDITION.

IT will become very evident that there are many more decided changes in the National Formulary, Fourth Edition, when comparison is made with previous revisions, than in the ninth revision of the United States Pharmacopœia. The fixing of September 1 as the date when this Revision shall become official would then seemingly provoke more objection than the adoption of that date for the new Pharmacopœia, as legal standard. The publication of the Formulary has, however, advanced further so that the supply of books will soon equal the demand.

Many of the changes in the National Formulary, Fourth Edition, were compelled by the recognition of authority in the Food and Drugs Act and State laws as legal standard, for up to this revision the book had been largely a formulary compiled for the convenience of pharmacists, and of course, with the idea in mind of providing uniformity in the included preparations, and of preserving the formulas that had been deleted from the Pharmacopœia. Endowed with the titled dignity of a legal standard, it became mandatory that such acceptances be based on a stronger claim than deletion from the Pharmacopœia alone. This assignment as guardian of said formulas will hereafter be largely delegated to the A. Ph. A. Recipe Book.

It is not the intention of this article to review the National Formulary, Fourth Edition, for this has been done by others, and in this issue of the JOURNAL will be found such a contribution by W. L. Scoville, vice-chairman of the National Formulary Committee of the American Pharmaceutical Association. The scope of the Pharmacopœia is controlled, at least largely so, by therapeutic considerations, while that of the National Formulary is as extensive as medical usage, and the formulas are prepared in accord with good pharmaceutical practice. In conformity with the latter view several preparations were deleted from the National Formulary, namely, because they were pharmaceutically unsatisfactory.

In revising the National Formulary the general principles followed in pharmacopœial revision were adopted. While the term mil is used in the formulas, the denomination milliliter has been retained in the text and as an equivalent in the formulas, so more correctly stated, milliliter has a preference. The metric sys-

tem is used throughout. A calculation method for converting metric valuations into apothecaries weight and measure is included.

The National Formulary, Fourth Edition, resembles the Pharmacopœia in general make-up and typography, and the nomenclature also is in accord with that standard. Part I contains the formulas, Part II provides standards for drugs used in the preparations of Part I, and Part III includes special tests and reagents.

After the Committee on Standards was appointed by the American Pharmaceutical Association the value of their work as a part of the National Formulary under revision was recognized, and admirably perfects this standard. Doubtless there are defects, but these are not very serious; in fact, those of reference are of standards for drugs subject to change, such as valerates, for example, where the chemical formula is given, without directing attention to the liability of change in constitution. Also such slight discrepancies as, for instance, the uniform designation of the source of angelica fruit and angelica root.

A point worthy of comment is the interest and devotion to duty of those who labored in the perfection of both the United States Pharmacopœia and National Formulary, truly a commendatory spirit of altruism that speaks volumes. It evidences that pharmacy is worth while, or certainly such painstaking effort would not obtain, when there is no pecuniary reward. The labor should bespeak the approbation of those who benefit thereby. It is noteworthy that in the preparation of both these standards members of the American Pharmaceutical Association are the principal participants, and those who are not share equally in the honors of the accomplishment—their credit is no less. The National Formulary is published under direction and authority of the American Pharmaceutical Association and naturally the members of the organization do the work. In continuing and providing this standard the pharmacists of the country acquire a resource and guide that would be impossible except through a coöperative organization, deeply and sincerely interested in the welfare of pharmacy. It is true that the Association is recompensed for its constructive work, and for incurring business risks, but this is necessary for the perpetuation of the standard; provision must always be made for the succeeding revision; there is also the desire of providing for more research work in pharmacy, which will contribute to better standards and better pharmacy. An individual or an organization may be altruistic and still not accomplish anything worth while. The success of such moving spirit is accentuated when there is preliminary action that produces the means for doing something and conserves these forces for continued or further activity. Like service, altruism has quality. If all druggists, who are beneficiaries of the work done by the Association, through its members, would enlist in the organization, the benefits accruing to all would be multiplied.

As the title of "Aristocrat Among Pharmacopœias" has been given to the United States Pharmacopœia so also is the National Formulary, Fourth Revision, an accomplishment in which the revisers may well have pride, and the assurance of having done most excellent service for pharmacy and those who are served by its votaries, the physicians and laity.

These statements would be incomplete without reference to the valuable and

constructive assistance rendered by the Hygienic Laboratory, United States Public Health Service, in compiling the Digest of Comments on the United States Pharmacopœia VIII and the National Formulary III. This service was not only very helpful but the thoroughness and completeness with which the work was done deserves appreciative mention. It might also be added that the continuation of the work will proceed by preparing similar digests of the present revisions of both the Pharmacopœia and National Formulary.

Constructive criticism makes for improvement, so the JOURNAL welcomes articles that point out defects and present progressive ideas, to the end that each revision will be an improved edition of those that have preceded. E. G. E.

THE ATLANTIC CITY MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

THE passing of time has brought another annual convention of the American Pharmaceutical Association near. A record of sixty-four years of work for American Pharmacy, shaping and directing the trend in so far as this was possible during this period, leaves the Association with a history in which the members have a right of pride and satisfaction. Though slow of growth, there is a slight annual increase of membership, and this year the number of new members has at this writing reached 353 and the anticipation of receiving 500 is possible. Why the additions to the membership of the Association should not show a larger increase remains one of the problems that has occupied the minds of members throughout the period of its existence, and so also the incentive which should hold them as members continuously.

The one thought that many druggists cannot appreciate sufficiently is, that pharmacy demands an organization of this kind; a body that gives thought to the professional side of the drug business, however much there is need for increasing the volume of business by sales of items more or less distantly related to pharmacy. While the American Pharmaceutical Association does not lose sight of such necessity, and provides opportunities for the discussion and development of such live topics in several of the Sections, its mission as the representative of American pharmacy cannot be neglected. Neither would this be the desire of the members nor even of those who are not affiliated. The latter are satisfied to let others do this necessary work and feel assured that there will always be a sufficient number, who are imbued with a spirit of altruism and devoted to the cause of pharmacy. This is the unfortunate situation, which is by no means peculiar to those engaged in the drug business. A survey of the promotions in every city will corroborate the statement; the delinquents are not invariably those who are unable, but quite as frequently men of means. This would apply to the Association if twice the value received would be turned back to those not interested, unless of course the come-back would be in actual money. There is absent in them that altruistic spirit which persuades the doing for others without return; their vision is obscured.

Fortunately there are many who are constituted otherwise, or a Pharmacopœia

or National Formulary would be a far more difficult undertaking, and the transactions of the American Pharmaceutical Association would be devoid of the valuable papers that speak for the true spirit of helpfulness to others. Neither is it possible to overcome the critical inclination, or rather hypercritical, for by this is meant that which is destructive and not constructive. This, too, everyone realizes and permeates everywhere. Within the Association there is little evidence of this trait, for those who continue their membership from year to year share with their associates the same determined purpose of accomplishing something that contributes to the welfare of the many, regardless of whether those outside of the Association profit by their efforts; in fact, they rejoice because they have been able to be of service. If this trait could be conveyed to more the numerical strength of the Association would be increased, and less would become delinquent; the thought of a direct return must be eliminated and that of service and coöperation substituted. The one who joins for a material benefit seldom persists—membership is not a good financial investment on such basis only, but if the affiliation is accompanied by a desire to be helpful and to sustain pharmacy which dignifies the aspirant's occupation, then the returns are indeed ample. It is difficult to approximate the value of the work done by the Association, the results are evident in every walk of life, whether social or commercial.

As an example of the beneficial influence of the Association, the interview of Chairman S. L. Hilton of the Committee on the Status of Pharmacists in the Government Service with the Secretary of the Navy, referred to under Editorial Notes, may be cited. As a result an order was issued to strike out the age limit as one of the requirements for eligibility to examinations for the grade of Pharmacist in the U. S. Navy. Nineteen Hospital Stewards will thereby have an opportunity for advancement.

The meeting in Atlantic City promises to be well attended, and Local Secretary Charles Holzhauer has the program, both of entertainments and conduct of the meeting, nearly completed. In this issue will be found tentative programs of all the Sections and sessions of the Association; also of the meetings of the National Association of Boards of Pharmacy and the American Conference of Pharmaceutical Faculties, to be held in Philadelphia, preceding the convention of the American Pharmaceutical Association in Atlantic City, September 5–9.

The completion of the United States Pharmacopœia and National Formulary, both of which become official September 1, 1916, will doubtless furnish interesting subjects for discussion. The interest along this line will be further enhanced by the address of Dr. Solomon Solis Cohen on "The Pharmacopœial Revision from a Medical Standpoint," or a related subject. All those who attended the Boston meeting of the American Pharmaceutical Association will remember his splendid effort on that occasion.

The programs of the Sections speak for abundance of work and excellent opportunities for a profitable meeting; and so far as the entertainments are concerned, the main difficulty will be in escaping from the many attractions provided by the Committee, and ever present in this popular resort.

E. G. E.

SOME OF THE CHANGES MADE IN THE NINTH DECENNIAL REVISION OF THE UNITED STATES PHARMACOPŒIA.*

BY GEORGE M. BERINGER, A.M., PH.M.

On the eve of the appearance of the Ninth Decennial Revision of the United States Pharmacopœia, it is very appropriate that the changes made in this legal authority for drugs should be discussed by pharmacists.

The present revisions of the Pharmacopœia and of the National Formulary are the first editions of these books to appear since they were specifically named in the Food and Drugs Act as the standards for the identity and quality of drugs. To revise the Pharmacopœia so that its standards shall properly fulfil this added responsibility has been the paramount thought of the revisers. Hence it may be observed that the Ninth Revision will be noteworthy for this purpose and its consequent aim at scientific accuracy, and this purpose has been the primary cause for many of the changes that will appear in this revision.

From a therapeutic standpoint, the changes made in the strength of the galenical preparations are, as a rule, negligible. For the most part, they have been minor and not sufficient to affect either the action or dosage of the preparations. As most of the potent remedies were brought into harmony with the Brussels International Protocol by the Eighth Decennial Revision, radical changes, such as were then made in the strengths of Tincture of Aconite and Tincture of Veratrum, are not now necessary.

It was to be expected that the advances and the changes occurring in medical practice, and likewise the progress of our knowledge of the composition of drugs and their therapeutic actions, would demonstrate that the requirements of that Protocol must be revised. Absolute compliance with all of its provisions is already no longer possible. In the two revisions of the Pharmacopœia that have been made since the promulgation of the International Protocol, we have given ample evidence of our good faith and adherence to the principles to which our nation as a participant in the Brussels Conference and as a signator to the Protocol committed us.

A few of the variations between the requirements of the Protocol and those of the United States Pharmacopœia are cited as examples, and the reasons for the non-acceptance of the international requirements are given. The Protocol requires that Aconite shall be "the tubers of the current year." In America this has never been considered practicable, as *Aconitum Napellus* is not indigenous nor cultivated in this country, and, under the conditions existing during the past two years, it would have been absolutely impossible to have complied with this requirement. Moreover, it is an established fact that aconite, properly stored, retains its activity for a long period, and hence this requirement was considered as unnecessary and has not been adopted in our Pharmacopœia. The Protocol specifies that Belladonna is to be "only the dried leaf." The commercial article is the dried leaves and tops, and hence the U.S.P. very correctly so defines it. The Protocol contains no standards for the tincture or extract of Belladonna, except that the latter shall contain "about 10 per cent. of moisture." The U.S.P. provides alkaloidal standards for both. The same criticism applies to the absence of

* Read at the meeting of the New Jersey Pharmaceutical Association, Long Branch, N. J., June 22, 1916.

standards in the Protocol for the preparations of Colchicum and Hyoscyamus. The Protocol directs that tincture of Strophanthus shall be made from the seed and not de-fatted and with a menstruum of 70 percent alcohol. We know that the fat in strophanthus is exceedingly disagreeable and nauseating, and that this fat can be removed with purified petroleum benzin without the loss of strophanthin. Moreover, 70 percent alcohol will not extract the drug, and hence the U. S. P. improves on the international preparation by the preliminary de-fatting of the seed and the use of alcohol as the menstruum.

The use for which a preparation is commonly administered may, likewise, necessitate a deviation from the Protocol, as adherence to its provisions would possibly prove a menace to life. As examples: Bitter almond water is commonly administered in the United States as a vehicle or flavoring medium in fairly large doses, and hence it is directed by the U.S.P. to contain not more than a mere trace of HCN. The Protocol requirement is 0.1 percent of HCN, and to follow this in the dosage in which bitter almond water is, at times, directed as a vehicle in the United States would be dangerous. The U.S.P. Syrup of Ipecac is seven times stronger than that of the Protocol. As this preparation is commonly used in the United States as an emetic, it was not deemed advisable to so reduce the strength as to render it valueless as an emetic in croup and similar affections in which it is so commonly employed.

As examples of the more important changes of strength of galenicals may be mentioned Unguentum Hydrargyri Dilutum from 33 per cent. to 30 per cent. of mercury in order to comply with the Protocol, and Syrupus Acidi Hydriodici, changed from 1.19 Gm. HI in 100 Cc. to from 1.3 Gm. to 1.45 Gm. in 100 mils.

The changes that have been made in the strength of the chemical products are, for the most part, such as were required by the commercial conditions and the quality of the products commonly dispensed as medicines. The principle of allowing for the proper variability of chemicals and for the natural variation in crude drugs has led to many modifications of the rubric requirements by which, instead of the fixed purity statements of the previous revision, there now appears in most of the monographs a variability allowance in accordance with determined conditions, and the limitations of such variability are officially defined. The following examples among the chemicals illustrate the desirability and practicability of this change, which, in many cases, has been only a rounding off of the requirements: The Eighth Revision required that Diluted Hydriodic Acid should contain not less than 10 percent HI; the Ninth Revision will state from 9.5 to 10.5 percent HI. In the Eighth Revision, Hydrochloric Acid was required to contain not less than 31.9 percent HCl; the Ninth Revision will state from 32 to 33 percent HCl. In the Eighth Revision, Ether was about 96 percent ethyl oxide; in the Ninth Revision it will be from 95.5 to 97.7 percent.

The purity of a few official chemicals has been increased. As examples: Ammonium Bromide, Potassium Bromide and Sodium Bromide have been each increased from 97 percent in the Eighth Revision to 98.5 percent of the respective absolute bromide. In a few cases the rubric is not so exacting as in the previous revision. The reasons for such modification are usually self-evident. As examples, Ferric Chloride is to contain 20 percent of Fe instead of 22 percent, and Thymol Iodide 43 percent of I instead of 45 percent.

A noticeable improvement is seen in the pharmacognostic descriptions. Here we have not only the microscopic appearance and structure of the drug described, but also descriptions of the powdered drug under the microscope. The purity rubric has been extended to the organic drugs, and these monographs commonly

give the percentage of allowable admixtures of other parts of the drug plants or other foreign matters. In the organic drugs and their preparations that permit of chemical assaying, limitations are likewise fixed for the variability naturally existing in the drugs and the personal equation or error introduced in the assay processes, and in each case the alkaloidal percentage is fixed by an upper and lower limit.

The assay processes introduce several changes, such as the use of purified saw dust as a distributing medium, and the adoption of the aliquot part method. Cantharides has a definite standard of cantharidin of not less than 0.6 percent, and an assay process is now given. In Nux Vomica, the percentage of total alkaloids is fixed at 2.5 percent in place of 1.25 percent strychnine, and the preparations of Nux Vomica are all assayed for total alkaloidal content. Opium must now contain not less than 9.5 percent *anhydrous* morphine instead of not less than 9 percent *crystallized* morphine, and the lime method of assay is adopted. This increase in strength is to be noted, and likewise the determination of morphine content in the anhydrous form instead of that of the crystallized alkaloid.

Assay processes have been extended to numerous preparations not previously assayed. Among such may be mentioned Benzoic Acid, Salicylic Acid, and Citrated Caffeine; and among preparations, Liniment of Camphor and Spirit of Camphor, for which a polariscope method for the determination of camphor is now introduced. Very few pharmaceutical laboratories have the expensive polariscopes required. Hence I fear that this test is more academic than practicable, and its observance in practice will be largely confined to the State Laboratories.

The Ninth Revision will be noted for the number of innovations in pharmacopœial revision. Among these may be mentioned "Electrolytic Determination," which is especially recommended as the method for assaying zinc and mercury compounds; official methods for the "Determination of Ash," "Saponification Values," " Acid Number of Resins," " Determination of Crude Fiber," " Volatile Extractive and Non-volatile Extractive," "Determination of Alcoholic Content," "Melting Points," "Boiling Points," and "Congealing Points," with a description of "Standard Thermometers, and Solubilities." The chapter on "Sterilization" should be carefully studied by every dispenser. The chapter on "Diagnostical Reagents and Clinical Tests" is an important addition to the U. S. P., in which the example of the later revisions of some of the foreign pharmacopœias, notably the German Pharmacopœia, is followed. This contains standard formulas for the reagents used in the examination of urine, gastric contents, blood, and microorganisms.

For the first time in the history of pharmacopœial revision, the methods for the biological assaying of drug products have been recognized. Chapter 23, in Part II, is devoted to this subject, and official processes are described by which the following drugs and their preparations *may be* assayed: Aconite, Digitalis, Strophanthus, Squills, and Dried Suprarenals, and Cannabis *must be* assayed by the official biological process. The standard adopted for the latter drug is that "Cannabis, made into a fluidextract in which one hundred mils represent one hundred grammes of the drug when assayed biologically, produces incoördination when administered to dogs in a dose of not more than 0.03 mil of fluidextract per kilogramme of weight."

The titles added to the list of pharmacopœial substances are only 66 in number. Some of these have been added because of their use as medicines necessitating standards. Among such may be mentioned: Ethyl Morphine Hydrochloride,

Diacetyl Morphine and Diacetyl Morphine Hydrochloride, Sodium Cacodylate, Calcium Glycero Phosphate, Sodium Glycero Phosphate, Creosote Carbonate, and Phenolphthalein.

Commercial conditions necessitated several changes. As examples: Virgin scammony not being now obtainable, scammony root was introduced as the source for making the official Scammony Resin, and Sodium Cyanide replaces Potassium Cyanide. The high price of potash salts, due to the war, has been recognized, and permission is given to substitute the sodium carbonate in place of the potassium carbonates in Solution of Magnesium Citrate, Rhubarb preparations, etc.

Several of the additions became necessary because they are ingredients in the formulas of the Pharmacopœia. Among these may be mentioned Glucose, directed as a diluent for solid extracts; Purified Siliceous Earth as a filtering medium, Oil of Sesame as an ingredient in liniments, and Sodium Indigotindisulphonate, introduced as a coloring for Poison Tablets of Corrosive Mercuric Chloride, which are to be "tablets of an angular shape (not discoid), having the word 'POISON' and the skull-and-crossbones design distinctly stamped upon each, and to contain 0.45 Gm. to 0.55 Gm. corrosive sublimate, and the tablets to be colored blue."

The preparations added have not been numerous, the tendency being to leave to the National Formulary the providing of formulas for preparations. Milk of Bismuth and Milk of Magnesia are two of the popular remedies, however, that have been given pharmacopœial standing.

Pharmacists will be pleased to learn that the list of powdered extracts has been greatly extended, and in several instances formulas for both the pilular extract and the powdered extract of the same drug are very properly given. The instructions of the Pharmacopœial Convention to adopt general formulas wherever possible has been partially carried out by the introduction of general instructions in the aromatic waters, and by general formulas and classifications in the fluidextracts and tinctures.

Two hundred and forty-two titles have been dismissed from the Pharmacopœia. Thirty-eight of these were fluidextracts, seven were pills, and ten were tinctures. A majority of these preparations have been included in the revised National Formulary, and so the National Formulary will relatively become more important because of these deletions from the Pharmacopœia.

Twenty-nine changes in the Latin titles have been made, and 28 changes in the English names. As examples: Alcohol Absolutum is now Alcohol Dehydratum; Aqua Hydrogenii Dioxidi is now Liquor Hydrogenii Dioxidi; Cardamomum is now Cardamomum Semen, the decorticated seed being the official drug; Elixir Adjuvans is now Elixir Glycyrrhizæ; Hyoscinæ Hydrobromidum is now Scopolaminæ Hydrobromidum; Rhamnus Purshianæ is now Cascara Sagrada.

One of the minor changes that has attracted, nevertheless, a great deal of attention is the adoption of the word "milliliter" in place of "cubic centimeter," and the word "mil" in place of "Cc." In this we have followed the example of the British Pharmacopœia and accepted the authority of the United States Bureau of Standards for the sake of absolute accuracy.

Synonymy will not be treated through the Index as in the Eighth Revision, but following each Latin title will be the official English title and the more commonly used synonyms. In addition to this, there will be official abbreviation printed in heavy type, with the hope that physicians will adopt these official abbreviations in prescription writing, so that there will be an official authority for the abbreviations for the official titles commonly used in prescriptions.

THE FOURTH NATIONAL FORMULARY.

BY WILBUR L. SCOVILLE.

The new National Formulary, like Cæsar's "all Gaul," is divided into three parts. This is also an imitation of the earliest U. S. Pharmacopœia, which found the arrangement of the formulas in alphabetical order by themselves, followed by the materia medica, and lastly by the reagents and tests, the best plan. They too put the formulas first, and the materials which composed them followed after.

Part I of the Formulary is the part which corresponds to the old preceding editions; and is still the main part of the book. The principal work of the National Formulary Committee has been applied to this part.

It is preceded by a historical chapter and preface, a list of additions, deletions and changed titles, a chapter on sterilization, and some preliminary notices. These summarize the changes so far as titles are concerned, but do not suggest the changes in the formulas themselves, which are important.

There are twelve introductory paragraphs or chapters in Part I, which describe twelve classes of the preparations and introduce each. These twelve titles are the only ones which do not apply directly to specific preparations. Some of the important changes in preparations may be classified as follows:

Elixirs.—Seventy-nine are now official, which is a small decrease in number. Most of the older formulas remain unchanged, but three new basic elixirs have been introduced,—Compound Elixir of Almond, Compound Elixir of Cardamom, and Compound Elixir of Vanillin. These are especially designed for elixirs of low alcoholic strength, and contain but 5 to 10 percent of alcohol. The Bromide elixirs have been reduced in alcoholic strength, also a few others, but it was thought wise to allow the flavor of these to remain the same as before. That "bone of contention," Compound Digestive Elixir, has been allowed to sink into "innocuous desuetude"; saccharin is used less freely than before, but still enters into a few preparations. The list is thirteen less than the N.F. III contained, which looks "unlucky" for some elixirs. It is still the second largest class in the book, and can afford to lose some of its members. The Harrison Law induced a slight change in Elixir Terpin Hydrate with Diacetyl-Morphine, the content of the latter being decreased.

Emulsions are also slightly decreased in numbers, but are improved in formulas; eight are now official, including two taken from the U.S.P. VIII.

Emplastra (plasters) are disappearing from professional pharmacy, and the N.F. has allowed twelve to "come off" and has added only one, out of compliment to the U.S.P.

Extracts.—Eight have been added (six from the U.S.P.) and seven dismissed, and standards with assay processes have been added to extracts of Cinchona, Conium, and Ignatia. Pharmacists should note these standards and see that their stock conforms.

The Fluidextracts are now the largest class of preparations in the Formulary, comprising 90 titles, of which 50 were added, and 30 of these were taken from the U.S.P.

The last N.F. Revision Committee has not, however, honored the tradition "When the Pharmacopœia forsakes thee, then the National Formulary will take thee up," but has said, "No! No!" to a number of preparations which the Pharmacopœia has dropped.

The National Formulary has come to a more discriminating age, and is no longer content to wear everything that U.S.P. casts off. For instance, no Coca preparations are now official in either book, because these have all proved unworthy of confidence, being so unstable that no standard can be maintained. The Viburnum Opulus of the N.F. IV is a different drug from the Viburnum Opulus of the U. S. P. VIII, and its preparations must conform to the new standards. And when the U.S.P. Committee decided that the available formulas for elixir of the phosphates of iron, quinine and strychnine were all unsatisfactory, and the preparation was dismissed from the Pharmacopœia, the N.F. decided not to be "the goat" and did not swallow the discarded can. So, while the N. F. did take up a large number of preparations which the U.S.P. discarded, those which were adopted are sound pharmaceutically, and are in active demand.

Standards and assay processes are included for fluidextracts of Cinchona (aqueous), Colchicum Corm, Conium, and Stramonium. These are in accord with previous standards, but pharmacists should note that they still hold, legally, and see to it that their stock conforms.

The *Fluidglycerates* are officially introduced to American Pharmacy by a short chapter on their character and uses, and five typical preparations. Whether this class shall increase or decrease in future editions will depend upon the success which these may meet.

Glycerite of Bismuth now leads the four preparations in this class, and is standardized. This preparation is very liable to vary in manufacture, and the standard is needed to secure uniformity.

The *Concentrated Infusion of Gentian Compound,* which was more properly a tincture, has now been compromised with the title "Infusum Gentianæ Compositum," wherein the original tincture infusion is directed to be made and then diluted with water. The "then" may cover an unlimited period of time, and the tincture can be prepared in any desired quantity, to be stored and await the time of dilution. But the title still remains "Infusum," etc.

Liniments.—These have disappeared and no new ones have come, but the *Liquors* have changed considerably. Fifteen have been dropped and eleven added, making a net loss of four. Among the new ones is Liquor Alumini Acetatis, which is an old title but a new preparation. This is Burow's Solution and a true aluminum acetate, while the solution formerly official under this title is now correctly recognized as Liquor Alumini Subacetatis. Some confusion is liable to result in this change, and pharmacists should be careful in supplying the article desired.

Changes will be found in the formulas for the antiseptic solutions and several of the iron solutions, and assay processes are appended to some of the latter. Next to the Fluidextracts the Solutions will show more changes than in any class of preparations.

Mixtures are increased by two and decreased by five, twenty remaining. This class shows few changes in the formulas, but some changes in titles which are important.

Mulla are new as a word, but old as a classs. The former title Unguenta Extensa is too cumbersome, and the simple title Mulla it is thought will prove much more satisfactory. The same five are official, and are now more easily classified.

Nebula or sprays are a new class to the N.F. Five formulas for this popular form of medication are now included, and these should prove useful in practice.

Oil-sprays are growing in service, and *Spirits* are increased by four, and decreased by nine, leaving nine official. The old Spiritus Cardamomi Compositus,

which was designed to produce an oil-solution in imitation of Tincture of Cardamom Compound, has been displaced by a totally different Spiritus Cardamomi Compositus, which is much stronger and of very different composition. The latter is used to make the new Compound Elixir of Cardamom. This is another change which is liable to cause some confusion for a time.

Compound Spirit of Vanillin is likewise introduced as a component for the preparation of the Elixir Vanillin Compound.

Syrups have won a dead heat in adding nine and dropping nine, so the number remains, as before, 44. Five of the new syrups are taken from the U. S. P. VIII and the others include syrup of Ammonium Hypophosphite, Compound Syrup of Figs, Syrup of Iodotannin and Syrup of Blackberries.

Tinctures have gained five in adding eighteen and dropping thirteen. Among the additions are Tincture of Cactus Grandiflorus, which is made from the fresh drug, Tincture of Caramel, which is designed to produce more uniform coloring when caramel is used in small quantities, and Crocated Tincture of Opium, which is a standardized and assayed preparation uniform in strength with the opium tinctures of the U.S.P. IX.

Antiperiodic Tincture (Warburg's Tincture) is now under two titles, the second calling for Antiperiodic Tincture without Aloes, so there can be no mistake when Warburg's Tincture is called for.

Tincture of Citrochloride of Iron now contains considerably more sodium citrate, and a green tincture is always assured.

Tincture of Ignatia has a standard of 0.2 percent of alkaloids. Compound Tincture of Viburnum is now made from high bush cranberry bark, and not from what is sold as cramp bark.

Troches have also split even in dropping eight titles and adding eight. The troches which remain have all been improved, so that more satisfactory results may be expected from these preparations. Here the changes will be found mostly in the formulas.

Ointments show little change in composition or number, four having been added (from the U.S.P. VIII) and three dismissed.

Wines are given a last stand in the N.F. The Pharmacopœia has dropped them all, and the N.F. has taken up the more important of those in use. Two wines of Colchicum and Wine of Ipecac are standardized and assay processes are included. Wines are a passing class of pharmaceuticals, but are likely to linger for some time yet. Look out for the standards in your stock.

The above indicates in brief the more obvious and important changes in the formulary portion of the National Formulary; Part II comprises the simples which are used in the formulas in Part I and are not official in the U.S.P. IX. No article which is not used in Part I is included in Part II. This part is the work of the Committee on Standards of the American Pharmaceutical Association, and is a new feature of the Formulary. Its purpose is obvious, to provide definitions and standards for all articles used in the Formulary, so that there can be no question as to what is intended in any given case. This brings it nearer to the Pharmacopœia in appearance and style than preceding editions, but there is one very essential difference between the Pharmacopœia and the National Formulary which will keep them distinct and will avoid conflict. The Pharmacopœia is an authority on therapeutics, and its scope is controlled by therapeutic considerations, but the National Formulary does not vouch for any therapeutic efficiency, and recognizes any preparation of pharmaceutical soundness which is used to a marked extent by physicians. The Pharmacopœia is controlled by the "regular" school of

practice, but the National Formulary makes no distinction between allopaths, homeopaths, osteopaths, chiropractors or any other school of practice. Its mission is to perfect or select the pharmaceutical qualities of the formulas, and to allow the physicians as a whole to adjust or judge the therapeutics. Hence there is not likely to develop any rivalry or antagonism between the two books. Since both Parts I and II contain assays and tests which require test solutions and some special test directions, it seemed wise to embody the more special tests in Part III. This is taken directly from the U.S.P. IX, by permission of the Board of Trustees, and is designed to make the Formulary more complete as a working book. Volumetric solutions and the usual test solutions are not included, although employed in N.F. tests, because these are made by standard and well-known methods. Only the special tests are included. This part will doubtless be used more by manufacturers than by retail pharmacists, but the latter should not overlook the fact that the standards of the National Formulary IV apply after September 1, 1916, to all stock sold under the titles therein. Pharmacists should go over their stock, and set aside for readjustment all preparations not conforming to the new standards.

ALCOHOL DETERMINATION BY DISTILLATION.

BY A. B. LYONS.

An official method for the determination of alcohol in pharmaceutical preparations appears in U. S. P. IX and also in N. F. IV. The principle is the familiar one of distilling from an accurately measured volume of the alcoholic liquid, diluted with sufficient water, an equal volume of distillate, the specific gravity of which indicates, by reference to an alcoholometric table, the percent by volume of anhydrous alcohol. It is essential that the measurements before and after distillation shall be made with exactness, and it goes without saying that in all exact measurements of liquids temperature is an important factor.

It has been the common practice to make these measurements at 60° F., the standard temperature for alcohol determinations. The air temperature in most laboratories is many degrees higher than this, the year around, and where the pycnometer is used for determination of the specific gravity, condensation of atmospheric moisture makes accurate weighing difficult. Hence it has become customary to make the weighing at room temperature, although the measurement has been made at 60° F., the necessary correction being taken from an empirical table, such as is given in U. S. P. IX.

It is simpler to make the measurement also at room temperature, taking care only that this temperature is the same for both the measurements. The principle is sound, and *so long as the volume of the distillate is the same as that of the sample* taken for distillation, the results will be correct, provided the whole of the alcohol passes over by the time this volume is obtained—*i.e.*, in case of a liquid containing not more than 25 percent alcohol.

If this liquid contains more than 25 percent of spirit, it is necessary to carry this distillation further and the common practice has been to bring the volume of the distillate to just double that of the sample distilled. Now, however, we may no longer make our measurements at any but the standard temperature, viz.: 60° F. The reason for this is that the coefficient of expansion for mixtures of alcohol and water varies greatly with the proportion of alcohol present, being, for example, four times as great for 95 percent alcohol as for 8 percent. Consequently the error in the first measurement will be materially greater than that of the second if both are made at the same temperature.

The measurements may, however, both be made at 60° F., for the reason that volume percentages of alcohol are true only at 60° F. A 50 percent alcohol is one which contains at 60° F., one-half its volume of anhydrous alcohol, measured also at 60° F. If the temperature is raised to 75° F., the dilute spirit will contain more than one-half its volume of anhydrous alcohol measured at 75° F.

In determining alcohol in a liquid containing more than 50 percent, some advise to distil off four volumes for one, determining the percent of alcohol in the distillate and multiplying this figure by four. Obviously if this is done the error arising from making the measurements at room temperature will be considerably greater than in case the distillate is double the volume of the sample.

The official directions are to make the measurements at any convenient temperature, being careful only that both are made at the same temperature. The error involved where the temperature is not higher than 25° C. is negligible in case the percentage is not above 30. In case of stronger spirit in warm summer weather, the error may easily exceed 0.5 percent.

The official process should therefore be amended to require that both measurements be made at 60° F. The weighing can then be made at any convenient temperature, the percent being deduced from the official alcohol tables.

ACETYLSALICYLIC ACID.

While the loosely worded test of the British Pharmacopœia for this article is quite unsatisfactory, there can be no doubt that the melting point has not been, as was recently alleged, fixed too high by that authority. The intensity of the ferric-chloride color reaction is undoubtedly in more or less direct relationship with the depression of the melting point, and, of course, with the amount of impurities present. An interesting series of experiments has recently been carried out by Tsakalotos and Horsch (Bull. Chem. Soc., 1915, 17, 401), who have attempted to study the rate of decomposition of acetylsalicylic acid in aqueous solution at 23°, 50°, and 60°, the rate of decomposition being measured by removing 25 Cc. of the solution at given intervals and titrating it with one fiftieth-normal barium hydroxide. At 50° they also carried out a series of electrical conductivity measurements. In both cases the curves showed two minima, the times at which these occur being found to be dependent on the temperature. It appears to be generally assumed that the impurities and decomposition-products of acetylsalicylic acid are traces of salicylic acid and of acetic acid. But, although this may be, and probably is, to a great extent true, there is little doubt that the matter is not quite so simple as that generally assumed. There is no doubt that in the course of the reaction by which some manufacturers prepare acetylsalicylic acid a secondary reaction goes on. Whether it be while in the nascent state only or not cannot be definitely decided, but the acetylsalicylic acid first formed in the reaction itself reacts upon unaltered salicylic acid forming a further substitution-product, acetylsalicyl-salicylic acid, a product which probably decomposes in contact with water into aceto-salicylic and salicylic acids, the former in turn decomposing into acetic and salicylic acid. Hence the quantitative experiments of Tsakalotos and Horsch may well be considered indefinite, unless the acid experimented upon was free from acetylsalicyl-salicylic acid. There is reason to believe that the true melting point of acetylsalicylic acid is nearer 136°–137° than to any other figure, and that unless prepared by certain methods the impurities above indicated are exceedingly difficult, if not impossible, to eliminate.—E. J. PARRY in *Chem. and Drug.*, June 3, 1916.

SCIENTIFIC SECTION, AMERICAN PHARMACEUTICAL ASSOCIATION

UREASE.*

BY H. A. B. DUNNING.

Urease is an enzyme found in numerous bacteria, fungi, and in certain higher plants. It readily converts urea into ammonium carbonate and, on this account, is not only interesting, but extremely useful as a diagnostic agent.

$$CO\begin{matrix}NH_2\\NH_2\end{matrix} + 2H_2O = CO\begin{matrix}ONH_4\\ONH_4\end{matrix}$$

The presence of urease in soy bean (*Glycine hispida*) was first observed by Takeuchi, and was afterwards applied to the quantitative estimation of urea by E. K. Marshall, Jr., Ph.D., of the Physiological Chemical Laboratory of the Johns Hopkins Medical School.

To estimate the amount of urea in urine, it is only necessary to determine, with decinormal hydrochloric acid and methyl orange, the degree of natural alkalinity of a portion of the specimen that has not been treated, and compare this, as to alkalinity, with an equal quantity of the same specimen which has been treated with the enzyme. The difference, of course, represents the ammonium carbonate formed by the breaking up of the urea present; the amount of this urea can be readily ascertained by calculating its equivalent in ammonium carbonate as hereinafter shown.

This method yields accurate results by a procedure much simpler than any heretofore employed; the other accurate methods in general use all require an independent determination of the pre-formed ammonia, and generally are too complicated to be favored for rapid clinical work. It is because of such difficulties and complications that the various older methods, which require the decomposition of urea by an alkaline solution of sodium hypobromite and the measurement of the nitrogen evolved, are still used for clinical purposes; these hypobromite methods, however, as is well known, are very inaccurate, the results being vitiated by the presence of unknown quantities of ammonium salts.

In developing the urease method, Dr. Marshall first obtained the enzyme, in an aqueous extract of ground soy beans, by treating them with water, precipitating much of the protein matter with hydrochloric acid, and clearing the solution by filtration; this solution was preserved with toluol, but could not be satisfactorily kept longer than about a week.

The soy bean extract yields accurate results, but possesses certain disadvantages, especially when rapid estimations are desired. As previously stated, it deteriorates on standing and must, on this account, be freshly prepared at short intervals, and, to ascertain the extent of its inherent effect on methyl orange, a preliminary determination or titration of the extract, itself, must be made. Besides these objections, the larger amount of soy bean extract required to produce rapid conversion of urea makes a solution that becomes very cloudy upon the addition of acid, due to the precipitation of more of the proteins; this cloudiness interferes with a close observation of the color change and thus causes a sacrifice of the

* Read before Scientific Section, A. Ph. A., San Francisco meeting.

accuracy that follows sharp end reactions. These disadvantages led to the preparation of urease.

Urease is a fine, almost white powder with little taste or odor; it is soluble in slightly alkaline water and presents the urea-converting enzyme of soy bean in a condition approximating purity. It is practically free of water-soluble proteins that are precipitated by hydrochloric acid and of proteins that are insoluble in water. Aqueous solutions deteriorate after standing a few days.

For the estimation of urea, urease possesses the following advantages over the soy bean extract: (*a*) It is practically neutral to methyl orange, which characteristic renders unnecessary the blank determination that is required for the alkaline soy bean extract; (*b*) it can be preserved in dry form, suitable for immediate use, indefinitely; (*c*) it is readily soluble in urine; (*d*) it gives a clear end reaction, since it yields very little cloudiness on the addition of acid during titration, and, consequently, can be used in larger proportions without the sacrifice of accuracy that follows the use of increased quantities of the soy bean extract.

The procedure for using urease is identical with the original technic of Marshall, excepting that 25 milligrammes (one tablet) of this dry substance are substituted for two cubic centimetres of the liquid soy bean extract. For the more rapid decomposition of the urea, two modifications of his original method are suggested by Dr. Marshall: first, the use of a greater proportion of the enzyme to the urine treated; second, an increase of temperature to 35°–40° C., during the catalytic process.

DIRECTIONS FOR USING UREASE.

Apparatus and material: Besides the urease, which for convenience in the test may be had in 25 milligramme tablets, there are required four 200 cubic centimeter Erlenmeyer flasks with cork stoppers; one 50 cubic centimeter glass-stoppered burette; one 5 cubic centimeter bulb pipette; one small glass mortar; 100 Cc. solution of methyl orange; 1000 Cc. decinormal hydrochloric acid and 50 Cc. toluol.

For Urine.—Put 1 or 2 cubic centimeters of toluol into each of two Erlenmeyer flasks of 200 cubic centimeter capacity. Into one of the flasks, introduce exactly 5 cubic centimeters of a specimen and 100 cubic centimeters of distilled water; stopper the flask with a cork. Place 25 milligrammes urease or crush a tablet of same weight in a small glass mortar, and dissolve it in about 5 cubic centimeters of water. Transfer this solution, without loss, into the other flask containing toluol, and rinse the mortar with several portions of distilled water until about 100 cubic centimeters have, in this way, been added to the contents of the second flask; now add exactly 5 cubic centimeters of the urine specimen and stopper with a cork.

Agitate each flask thoroughly, to mix its contents, and allow both flasks to stand at room temperature over night, or, at least, eight hours, for the slow method. Should it be desired to use the rapid method, the procedure is exactly the same, excepting that two tablets are used for a test and the mixture containing the specimen is digested at about 40° C. for one hour.

The test may be completed in fifteen minutes by using 1 cubic centimeter of urine specimen, 50 milligrammes of urease, and digesting the mixture at 40° C. for about fifteen minutes. The factor would in this case be the whole number, 3, instead of the decimal, .6 (see last paragraph).

After the lapse of the proper time, the two solutions should be titrated to a distinct pink color with decinormal hydrochloric acid, using methyl orange as an indicator.

Should it be desired to make a large number of determinations at one time,

the 5 cubic centimeter control portions of the several specimens may be titrated, as to existing alkalinity, with decinormal hydrochloric acid and methyl orange, one after another, in the same flask, at the time the portions to be examined for urea are prepared in separate flasks, for digestion; also, in such cases, a sufficient amount of urease for all the determinations may be rubbed up in a mortar, with a measured quantity of distilled water, and an aliquot portion, with 100 cubic centimeters of distilled water, added to each of the separate specimens that are to be treated with the enzyme.

For Blood.—Either of two procedures may be used. One is the method given by Dr. Marshall in his paper, "A New Method for the Determination of Urea in Blood," published in the *Journal of Biological Chemistry*, vol. xv, No. 3, Sept., 1913.

The other method, also suggested by Dr. Marshall, is to draw 5 cubic centimeters of blood from a vein with a hypodermatic needle, into a five cubic centimeter pipette, and immediately transfer the specimen to a test-tube, containing 1 to 2 cubic centimeters of one percent sodium oxalate solution. To this is added 25 milligrammes of urease, previously dissolved in 5 cubic centimeters of water. This mixture is allowed to stand until the urea of the blood is decomposed; at ordinary room temperature, one-half hour is usually sufficient. It is better, however, to place the test-tube in a beaker of water at 30° to 40° C. for one-half hour. After the urea has been changed, the contents and sufficient washings of the tube are transferred to a cylinder. The ammonia is then removed by a current of air, collected in fiftieth-normal hydrochloric acid and titrated with fiftieth-normal sodium hydroxide.

CALCULATING UREA CONTENT.

As the purpose in using urease is to convert the urea present in a specimen into an easily estimated substance—ammonium carbonate—and as the amount of this salt produced from this source by the enzyme is indicated by the increased alkalinity of the specimen to methyl orange, it is obvious that the quantity of standard hydrochloric acid required to exactly neutralize the contents of the flask containing urease, less the quantity required for the control specimen, corresponds to the ammonium carbonate formed by the conversion of the urea originally present in the specimen.

By the equation appearing at the beginning of this paper, it will be readily seen that 60 grammes of urea would be converted, by urease, into 96 grammes of ammonium carbonate, which amount would require 72 grammes of standard hydrochloric acid to neutralize it.

As this quantity (72 grammes) of hydrochloric acid is contained in twenty thousand cubic centimeters (20,000 Cc.) of decinormal ($\frac{N}{10}$) hydrochloric acid solution and is equivalent to 60 grammes of urea, as represented by 96 grammes of ammonium carbonate, it follows that one twenty-thousandth (1/20,000) of this quantity, or one cubic centimeter (1 Cc.), of decinormal hydrochloric acid would be the equivalent of one twenty-thousandth of 60 grammes—three milligrammes ($60 \div 20{,}000 = .003$); therefore, each cubic centimeter of decinormal hydrochloric acid required to neutralize an enzyme treated specimen that is in excess of the number of cubic centimeters required to neutralize the control specimen represents 3 milligrammes of urea, and, as the 5 Cc. specimen is the one two-hundredth part of a liter, it will be only necessary to multiply the number of cubic centimeters of the decinormal hydrochloric acid solution, in excess of the control's requirements, by the factor, $.6(.003 \times 200 - .6)$, to ascertain the urea per liter, when estimating the daily output.

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CONTRIBUTED AND SELECTED

STUDIES ON THE QUANTITATIVE ESTIMATION OF ALKALOIDS BY MEANS OF IMMISCIBLE SOLVENTS.*

BY GEORGE D. BEAL AND HARRY F. LEWIS.

I. INTRODUCTION: DISCUSSION OF THE PROBLEM.

One of the oldest and most widely used methods of alkaloidal assay is based upon the general principle that alkaloids themselves are quite insoluble in water and soluble in organic solvents, while their salts are soluble in water and insoluble in the organic solvents. The method of alkaloidal assay based upon this principle is known as the "shaking out" process familiar through its connection with the Dragendorff[1] method of plant analysis and the Stas-Otto[2] poison assay. It is assumed that the alkaloidal salt is practically insoluble in organic solvents and the alkaloid insoluble in neutral aqueous solutions. It also assumes that the salt is neither hydrolyzed by the aqueous solvent nor decomposed by the organic solvent. Both Dragendorff and Otto certainly realized that the principles were not absolute. Dragendorff made exception to the rule in the case of the almost quantitative removal of caffeine and the removal of traces of veratrine by benzene and of theobromine, colchicine, papaverine, narceine and traces of narcotine by chloroform from acid aqueous solution of the alkaloids. Otto recognized the fact that ether took up traces of colchicine, papaverine, narcotine, veratrine and atropine from their acid solution.

In most alkaloidal assays of this type, the acid aqueous solution obtained by the extraction of the sample with dilute acid is shaken out with the organic solvent, in order to remove from the mixture those substances which might later appear with the alkaloid, causing inaccurate results in the assay. Such substances are coloring matter, essential oils, bitter principles, tannins, etc. After this the acid aqueous solution is made alkaline and shaken out with more immiscible solvent, removing the alkaloid in more or less pure condition. Purification is completed by shaking out this chloroform or ether solution with acid, making the acid solution alkaline and shaking out with more chloroform or ether. This is done several times. Finally, the organic solvent is removed by evaporation, and the residue determined by direct weight or by dissolving in standard acid and titrating the excess with standard alkali.

During the process, several sources of error are being introduced. In the first place, the alkaloidal salt may be slightly soluble in the organic solvent. There is also the possibility of the salt being hydrolyzed by the water present into free alkaloid and acid. This free alkaloid would be easily soluble in the organic solvent. There are some cases known where the organic solvent either decomposes the alkaloid or else combines with it. These factors may cause a decrease in the amount of alkaloid in the acid solution with a corresponding decrease in the total alkaloid at the end of the assay. During the removal of the alkaloid from an alkaline solution by extraction with organic solvent, any insolubility of the alkaloid in the solvent and solubility in

* This paper presents the essential parts of the thesis presented by Mr. Lewis in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Chemistry in the Graduate School of the University of Illinois.

the alkaline solution will cause low results. This last, however, is not a great source of error, except in the extraction of certain alkaloids with ether. And finally, the shaking out of the alkaloidal solution in organic solvent introduces the problem of the possible insolubility of the salt formed in the acid solution or, if not its insolubility, its slow solubility. This is very apparent in the case of the salts of strychnine.

It is the purpose of this work to obtain such results as will describe the partition of the alkaloid between the acid layer and the immiscible solvent, using different acids under different concentration conditions. In order to obtain more complete data, the equilibrium conditions were determined, starting with an acid solution of the alkaloid and, as well, shaking out the solution of the alkaloid in organic solvent with an acid. Thus it is hoped that the following conditions might be established for each alkaloid:

(*a*) Which salt is most insoluble in chloroform or ether, and what concentration of acid is most favorable to this condition.

(*b*) Which acid, and in what concentration, removes the alkaloid most completely from its solution in chloroform or ether.

In order to put the results obtained in the form most quickly available, a new term, that of *extraction factor,* has been introduced and the factor calculated for the different sets of conditions obtained in the course of the research. By *extraction factor* is meant the ratio of the amount of alkaloid in the layer of added solvent to the amount originally present in the first solution. For practical purposes, this would be a far better value to have than that of the partition ratio or the sum of the partition ratios for the different alkaloidal molecular species present. The extraction factor shows at a glance the completeness of the extraction, an indication of the value of extraction under those conditions. The partition ratio tells only the partition of one molecular species between two layers of equal volume, by definition of the term *partition ratio.*

II. HISTORICAL.

Attention was first called to the quantitative solution of the problem through an article published by Dr. C. Kippenberger[3] in 1897. In this paper he states clearly the possibilities of error in alkaloidal estimation through hydrolysis of the salt with the subsequent solution of the free alkaloid. He suggests the use of chloroform or chloroform containing a little alcohol as solvents.

Three years later Kippenberger[4] published a second paper, in which he endeavored to establish the question on a firmer basis. He worked with the alkaloids strychnine, brucine, atropine, morphine, aconitine, veratrine, papaverine, narceine, codeine, emetine, pelletierine, cocaine, quinine, narcotine, coniine, sparteine, thebaine, hyoscyamine, daturine, scopolamine and the base caffeine. For shaking out he used chloroform and ether.

The action of the salts of the following acids was studied: Hydrochloric acid, 21.9 percent, HCl; sulphuric acid, 40.1 percent, H_2SO_4; tartaric acid; oxalic acid. In some cases, sodium chloride was added to the acid solution and its effect observed.

The alkaloid was dissolved with an excess of acid in 70 Cc. of water, and 50 Cc. of the immiscible solvent added. This mixture was shaken in a separatory funnel for about three minutes. After fully clearing, the layers were separated and the chloroform or ether layer washed with a few Cc. of water. The organic solvent was then evaporated on a water-bath and the residue, alkaloid plus alkaloidal salt, dried over concentrated sulphuric acid. The amounts of alkaloid and alkaloidal salt were determined in the following manner; the residue was dissolved

in an excess of $\frac{N}{50}$ standard acid and the excess acid titrated back with $\frac{N}{50}$ standard alkali. This value for acid neutralized by alkaloid indicated the amount of free alkaloid present in the residue. The solution was then made alkaline with a slight excess of sodium hydroxide and extracted again with chloroform. The amount of total alkaloid was obtained by evaporation of the solvent and solution of the residue in standard acid with titration for excess acid as before. Subtraction of the first value, that of the free alkaloid from the second, or total alkaloid value will give the amount of alkaloid present in the residue as salt.

The results are found in the following tables. The column containing the strength of acidity was compiled by the authors of this paper, from the data of Kippenberger.

TABLE I.

EXTRACTION OF AN ALKALOID BY CHLOROFORM FROM ITS SOLUTION IN HYDROCHLORIC ACID (KIPPENBERGER).

Alkaloid solution in 70 Cc. water.	Amount of alkaloid in 50 Cc. $CHCl_3$.	Indicator.	Strength of acid.	Alkaloid. Free.	Alkaloid. Salt.
Gm.					
0.2 Strychnine	0.0910	Azolitmin	0.15N	0.0114	0.0806
0.2 Brucine	0.0798	Azolitmin	0.075N	0.0056	0.0742
0.2 Atropine	0.0014	Azolitmin	0.075N		
0.2 Morphine	.....	Azolitmin	0.075N		
0.2 Aconitine	0.0971	Azolitmin	0.03N	0.0158	0.0813
0.2 Veratrine	0.0807	Azolitmin	0.075N	0.0077	0.0730
0.2 Codeine	Trace	Azolitmin	0.03N		
0.2 Cocaine	0.0021	Azolitmin	0.015N		
0.2 Quinine	Trace	Azolitmin	0.03N		

TABLE II.

EXTRACTION OF AN ALKALOID BY CHLOROFORM FROM ITS SOLUTION IN SULPHURIC ACID (KIPPENBERGER).

Alkaloid solution in 70 Cc. water.	Amount of alkaloid in 50 Cc. $CHCl_3$.	Indicator.	Strength of acid.	Alkaloid. Free.	Alkaloid. Salt.
Gm.					
0.2 Strychnine	Trace	Azolitmin	0.17N		
0.2 Brucine	0.0020	Azolitmin	0.17N		
0.2 Atropine	.....	Azolitmin	0.034N		
0.2 Morphine	.....	Azolitmin	0.034N		
0.2 Aconitine	0.0120	Azolitmin	0.017N	0.0120	
	0.0064	Azolitmin	0.085N	0.0064	
	Trace	Azolitmin	0.255N		
0.2 Veratrine	Trace	Azolitmin	0.017N		
0.2 Codeine	.....	Azolitmin	0.034N		
0.2 Quinine	.....	Azolitmin	0.034N		

TABLE III.

EXTRACTION OF AN ALKALOID BY CHLOROFORM FROM ITS SOLUTION IN A MIXTURE OF HYDROCHLORIC ACID AND SODIUM CHLORIDE (KIPPENBERGER).

Alkaloid solution in 70 Cc. water.	Amount of alkaloid in 50 Cc. $CHCl_3$.	Indicator.	Strength of acid.	Alkaloid. Free.	Alkaloid. Salt.
Gm.					
0.2 Atropine, 14 Cc. NaCl	0.0192	Azolitmin	0.075N	.....	Trace
0.2 Atropine, 14 Cc. NaCl	0.0149	Azolitmin	0.015N	.....	Trace
0.2 Quinine, 14 Cc. NaCl	0.0100	Hæmatoxylin	0.03N	0.0037 0.0063	Acid salt Neutral salt
0.2 Aconitine, 14 Cc. NaCl	0.2160	Azolitmin	0.017N	0.0306	0.1854
0.2 Quinine	0.0057	Hæmatoxylin	0.03N	0.004 0.0017	Acid salt Neutral salt

TABLE IV.

EXTRACTION OF AN ALKALOID BY CHLOROFORM FROM ITS SOLUTION IN TARTARIC ACID (KIPPENBERGER).

Alkaloid solution in 70 Cc. water.	Amount of alkaloid in 50 Cc. $CHCl_3$.	Indicator.	Strength of acid.	Alkaloid. Free.	Alkaloid. Salt.
Gm.					
0.2 Strychnine 0.4 Tartaric Acid	0.0020	Azolitmin	.....		
0.4 Brucine 0.4 Tartaric Acid	0.0032	Azolitmin	.....		

TABLE V.

RESULTS OF SHAKING OUT THE ACID ALKALOIDAL SOLUTION WITH ETHER, UNDER THE SAME CONDITIONS AS BEFORE (KIPPENBERGER).

FROM HYDROCHLORIC ACID SOLUTION.

Ether took up:

Narcotine.....0.0002 grammes.

Caffeine.....0.0112 grammes, as free caffeine.

The following were found in noticeable traces:

Aconitine, narceine, and emetine.

None of the other alkaloids gave up a trace to ether.

FROM SULPHURIC ACID SOLUTION.

Ether took up:

Caffeine.....0.0083 grammes as free caffeine.

The following were found in noticeable amounts:

Aconitine, papaverine, narceine, emetine and narcotine, also very slight traces of veratrine, strychnine, and codeine.

THE ADDITION OF SODIUM CHLORIDE TO THE SOLUTIONS GAVE THE FOLLOWING RESULTS:

(*a*) From hydrochloric acid in noticeable traces:
Narcotine, atropine, and quinine.

(*b*) From sulphuric acid solution:
Aconitine.

Ether removed neither brucine nor strychnine from tartaric acid solutions.

In 1901, Hans Proelss[5] gave a short description of the behavior of alkaloidal solutions toward different solvents. The work was divided in two parts: The first to determine the best solvent for the alkaloids as a class, and the second, the best solvent for the individual alkaloids. He compared the relative extractive powers of ether, chloroform, and benzene, and also mixtures of ether and chloroform, and alcohol and chloroform, for the alkaloids picrotoxin, veratrine, strychnine, atropine, codeine, and morphine. His method consisted in dissolving 0.1 gramme of alkaloid in 50 Cc. of water containing a few drops of hydrochloric acid. After making alkaline with sodium carbonate, the aqueous solution was extracted three times with the solvent. He states that constant results could not be obtained of sufficient accuracy to be anything more than comparative.

1. THE BEST SOLVENT FOR ALKALOIDS IN GENERAL.

Solvent.	Results.
Ether	Very good with colchicine, brucine.
Chloroform	Very good with colchicine, brucine, digitalin, veratrine, atropine, strychnine.
Chloroform and ether	Very good with colchicine, atropine, veratrine, picrotoxin.
Chloroform and alcohol	Very good with colchicine, veratrine, digitalin, atropine, codeine, morphine plus potassium bicarbonate.
Benzene	Very good with colchicine, strychnine, atropine, codeine, picrotoxin.

In conclusion he states that the best shaking-out liquid for alkaloids in general is chloroform, because of the solubility of most of the alkaloids in chloroform.

2. THE BEST SHAKING-OUT LIQUID FOR THE INDIVIDUAL ALKALOIDS.

Alkaloids.	Results.
Atropine	Any solvent satisfactory.
Brucine	Same as for picrotoxin.
Codeine	Alcohol plus chloroform, benzene.
Colchicine	Any solvent satisfactory.
Morphine	Alcohol plus chloroform from potassium carbonate solution.
Picrotoxin	Ether, chloroform from sodium carbonate-ammonium hydroxide solution.
Strychnine	Chloroform, alcohol plus chloroform, benzene from sodium carbonate-ammoniacal solution.
Veratrine	Chloroform, ether plus chloroform, ether and benzene from ammoniacal solution.

In conclusion, he states that emulsions form easiest with benzene and least with ether.

Ed. Springer,[6] in 1902, studied the effect of the solvent chloroform on the extraction of the following alkaloids: Morphine, coniine, narcotine, strychnine, quinine, codeine, veratrine, and cocaine from solutions made acid with sulphuric, phosphoric, hydrochloric, tartaric, acetic, oxalic and citric acids.

The amount of alkaloid in the residue after evaporation of chloroform was determined by titration in the same way that Kippenberger did. For some reason, he was unable to obtain check results, and so his work is of no value from a quantitative stand-point.

The following are his results:

Aconitine.—Aconitine is removed as the salt from hydrochloric acid and as the pure salt in traces from the sulphuric acid solution.

Atropine.—From hydrochloric acid, traces were removed as the salt; from sulphuric acid, traces as the free alkaloid; traces were found from the tartaric acid solution, also.

Cocaine.—Some alkaloid is extracted from sulphuric and hydrochloric acid solutions, where the acid is present in small concentration.

Codeine.—Codeine is not found in the chloroform residues from extraction of solutions of alkaloids in phosphoric, tartaric, oxalic, citric, and sulphuric acids, although in the last case it was found that if the concentration of the acid was low enough, some of the alkaloid would be removed as the free base.

Morphine, Coniine, and Nicotine.—No alkaloid was extracted from solutions made acid with the following acids: Hydrochloric, sulphuric and phosphoric.

Narcotine.—Narcotine is removed from both hydrochloric and sulphuric acid solutions, partly as base and partly as salt.

Quinine.—No alkaloid is removed from solutions of the sulphate, tartrate or phosphate. Some quinine is removed as the hydrochloride.

Strychnine.—About 25 percent was removed from the hydrochloric acid solution as the salt. Slight traces were removed from the other acid solutions.

Veratrine.—Veratrine is removed in traces in solutions containing small amounts of tartaric, sulphuric, and citric acids, but such is not the case with large excess of sulphuric or phosphoric acids.

From this, it may be drawn that chloroform is a "good solvent" for the hydrochloric acid salts of the alkaloids. The solubility of the hydrochlorides is so great, in fact, that, if in excess of acid, the salt is taken over completely as the salt, and

only in the case of the weak base narcotine could traces of the free alkaloid be found in the chloroform extract.

From the table, one would expect to find in the chloroform extract from the sulphuric acid solution in the Dragendorff assay, aconitine and narcotine, as well as the alkaloids mentioned by Dragendorff himself. Strychnine, veratrine and atropine might also be found in small amounts.

TABLE VI.

BEHAVIOR OF NEUTRAL AND ACIDIFIED ALKALOIDAL SALT SOLUTIONS TOWARD EXTRACTION WITH CHLOROFORM (SIMMER).

Alkaloidal salt.	Amount in 50 Gm. water.	Strength, acid per cent.	Grammes alkaloid. Total.	Free.	Salt.
Strychnine hydrochloride	0.2377	0.0	0.0153	0.0142	0.0016
	0.2377	0.1	0.0083	0	0.0083
	0.2377	1.0	0.0250	0	0.0250
	0.2377	10.0	0.0559	0	0.0559
	0.2377	25.0	0.2330	0	0.2330
Strychnine hydrobromide	0.2480	0.0	0.0200	0.0133	0.0067
	0.2480	0.1	0.0167	0	0.0167
	0.2480	1.0	0.0350	0	0.0350
Strychnine hydriodide	0.2760	0.0	0.0560	0.0250	0.0317
Strychnine nitrate	0.2377	0.0	0.0283	0.0233	0.0050
	0.2377	1.0	0.0350	0	0.0350
Strychnine sulphate	0.2610	0.0	Trace		
	0.2610	1.0	Trace		
Veratrine hydrochloride	0.2110	0.0	0.0530	0.0499	0.0031
	0.2110	0.1	0.0327	0	0.0327
	0.2110	10.0	0.1248	0	0.1248
Veratrine nitrate	0.2200	0.0	0.0405	0.0405	0
	0.2200	1.0	0.0811	0	0.0811
Veratrine sulphate	0.2150	0.0	0.0374	0.0374	0
	0.2150	0.1	Traces		
Veratrine tartrate	0.2230	0.1	0.0842	0.0842	0
	0.2230	2.0	0.0155	0.0155	0
	0.2230	5.0	Traces		
Morphine hydrochloride	0.2470	0.0	0.0045	0.0045	0
	0.2470	0.1	0	0	0
	0.2470	5.0	0	0	0
Morphine sulphate	0.2500	0.0	0.0037	0.0037	0
	0.2500	0.1	0	0	0
Morphine acetate	0.2630	0.0	0.0197	0.0197	0
Codeine hydrochloride	0.2340	0.0	0.0371	0.0371	0
	0.2340	0.1	0.0015	0	0.0015
	0.2340	10.0	0.0079	0	0.0079
Codeine hydrobromide	0.2620	0.0	0.0126	0.0126	0
	0.2620	0.1	Traces		
	0.2620	10.0	0.0110	0	0.0110
	0.2620	25.0	0.0079	0	0.0079
Codeine sulphate	0.2470	0.0	0.0276	0.0276	0
	0.2470	0.1	Traces		
Codeine tartrate	0.2360	0.1	0.0110	0.0110	0
Codeine citrate	0.2480	0.0	0.0395	0.0395	0
	0.2480	0.1	0.0158	0.0158	0
Cocaine hydrochloride	0.2240	0.0	0.0490	0.0490	0
	0.2240	0.1	0.0037	0.0015	0.0022
	0.2240	1.0	0.0045	0	0.0045
	0.2240	10.0	0.0075	0	0.0075
Cocaine sulphate	0.2640	0.0	0.0143	0.0143	0
	0.2640	0.1	Traces		
Cocaine tartrate	0.2310	0.0	0.0543	0.0543	0
	0.2310	0.1	0.0528	0.0528	0
	0.2310	1.0	0.0332	0.0332	0
	0.2310	5.0	0.0015	0.0015	0
Atropine hydrochloride	0.2250	0.0	Traces of free atropine.		
	0.2250	0.1	Traces of free atropine.		
	0.2250	10.0	0.0028	0	0.0028

TABLE VII.

BEHAVIOR OF NEUTRAL AND ACIDIFIED ALKALOIDAL SALT SOLUTIONS TOWARD EXTRACTION WITH BENZENE (SIMMER).

Alkaloidal salt.	Amount in 50 Gm. of water.	Strength, acid per cent.	Grammes alkaloid. Total.	Free.	Salt.
Strychnine hydrochloride	0.2377	0.0	0.0075	0.0075	0
	0.2377	0.1	0	0	0
	0.2377	1.0	0	0	0
	0.2377	10.0	Traces		
Strychnine hydrobromide	0.2480	0.0	0.0033	0.0033	0
	0.2480	0.1	Traces		
Strychnine hydriodide	0.2760	0.0	0.0033	0.0033	0
Strychnine sulphate	0.2610	0.0	0	0	0
Strychnine nitrate	0.2377	0.1	Traces		
Veratrine sulphate	0.2150	0.0	Traces		
	0.2150	0.1	Traces		
Codeine hydrochloride	0.2340	0.0	0.0055	0.0055	0
	0.2340	0.1	0	0	0
	0.2340	10.0	0	0	0
Codeine hydrobromide	0.2620	0.0	0.0023	0.0023	0
	0.2620	1.0	0	0	0
Codeine sulphate	0.2470	0.0	0.0031	0.0031	0
Codeine citrate	0.2180	0.0	0.0023	0.0023	0

In 1906, Simmer[7] published an important paper on this subject. The work was divided in three parts:

1. The behavior of the salts of the common alkaloids toward extraction by chloroform and other important solvents.

2. The appearance of decomposition through treatment with chloroform.

3. The reducing action of the alkaloids.

Simmer prepared an aqueous solution of the alkaloidal salt, containing 0.2 gramme of the free alkaloid to 50 Cc. of solution, or 0.4 percent of the free alkaloid. He then acidified with the different acids until he obtained the desired concentrations. Simmer neglected to state definitely the amount of chloroform used in the extraction, but the general tone of the paper would lead one to believe that he used equal amounts of chloroform and aqueous solution. These were mixed and the extraction carried on for an hour. At the end of that time, the layers were separated and the chloroform evaporated. The amount of free alkaloid and alkaloidal salt was determined in the residue in the usual manner.

It will be seen from the tables that many neutral salts are extracted by both chloroform and benzene; this is especially true in the cases of the salts of the nitric and halogen acids.

With strychnine hydrochloride, the least amount of salt is extracted from the neutral solution and the most from the solution that contains a 10 percent excess of acid; the 25 percent acid gives up less alkaloid than the 10 percent solution.

The behavior of the weak bases colchicine, caffeine, narcotine, papaverine, and antipyrine is different. In strong hydrochloric acid solution of colchicine, there is as much alkaloid removed by the chloroform as from the aqueous solution. The same is true with sulphuric or phosphoric acid solutions. Caffeine, thebaine and narcotine are removed from weak tartaric acid solutions as easily as from stronger acid solutions. Papaverine, narcotine, and thebaine are removed simply as salts and not as free bases.

2. THE DECOMPOSING POWER OF THE ALKALOIDS ON CHLOROFORM.

The observation had been made by many authors that extraction of the alkaloids with chloroform is attended with a decomposition of the chloroform, giving rise to free hydrochloric acid.

In order to determine this, Simmer extracted a mixture of 50 Gm. of water and 2 Gm. of finely powdered alkaloid with 50 Gm. of chloroform for eight hours. First the water was tested. This always gave an opalescence with silver nitrate, but showed itself to be free from alkaloid, except in the few cases due to the relative insolubility of the alkaloid in chloroform. The chloroform layer was then evaporated and the residue dissolved in water containing a sufficient amount of sulphuric acid. Silver nitrate solution was then added. When a definite precipitate was observed, this was filtered, dissolved in ammonia and precipitated again with nitric acid. Then the pure precipitate was filtered in a Gooch crucible and weighed.

TABLE VIII.

Alkaloid, 2 Gm.	AgCl from the chloroform layer.	Corresponding to—	
		HCl.	Alkaloid.
Atropine	0.0038	0.0009	0.0072
Brucine	0.0138	0.0033	0.0333
Quinine	Traces		
Cinchonidine	Traces		
Cinchonine	Traces		
Cocaine	0.0021	0.0005	0.0042
Codeine	Traces		
Morphine	0		
Narcotine	0		
Nicotine	Traces		
Strychnine	0.0035	0.0008	0.0073
Veratrine	0.0043	0.0010	0.0173

Thus we see that the action of the alkaloid upon the chloroform is negligible, except in the cases of brucine and veratrine.

Marden and Elliott,[8] in 1914, published a paper on the methods of extraction by immiscible solvents from the point of view of the distribution ratios. They shook out the alkaloids aconitine, atropine, codeine, coniine, morphine, quinine, and strychnine with the solvents chloroform and ether. Ammonium hydroxide was used to make the acid solution alkaline.

From the distribution coefficient and a certain subsequent algebraic calculation, they could determine the number of extractions necessary to remove 99.9 percent of the alkaloid. The distribution ratio (d) is indicated by the expression.

$$\frac{\text{Concentration in 10 Cc. of water}}{\text{Concentration in 10 Cc. of non-aqueous solvent}} = \frac{C}{C} = (d)$$

The algebraic expression for the calculation of the number of shakings necessary for an extraction is indicated by

$$\frac{x_n}{x_o} = \left(\frac{da}{e + da}\right)^n \text{ where}$$

a = volume of the aqueous solvent.
e = volume of non-aqueous solvent.
d = distribution ratio.
x_o = original amount of material to be extracted in the aqueous layer.
x_n = amount of material in the water layer after n extractions.

In the system aconitine, ether and aqueous ammoniacal solution, using 100 Cc. water, 5 Cc. ammonium hydroxide, and 50 Cc. of ether, the following result was obtained, $d = 0.140$; but on substituting 30 Cc. of chloroform for the 50 Cc. of ether, the value of d became 0.017.

Atropine.—The distribution ratio in the system water and chloroform was

found to be very small and three extractions with 10 Cc. of chloroform from 50 Cc. of the aqueous solution were sufficient to remove the atropine.

Codeine.—In the system, 100 Cc. water, 5 Cc. ammonium hydroxide, and 50 Cc. ether, *d* had a value of 0.939. If 30 Cc. chloroform were substituted for the ether, the value became 0.0067.

Coniine.—Owing to the volatility of the coniine, it was very difficult to get the partition ratio.

Morphine.—In the system, saturated aqueous solution of potassium carbonate and a mixture of methyl alcohol and chloroform, *d* possessed a value of 0.154, with variations from 0.200 to 0.127. The value for the system, 100 Cc. water, containing 35 Gm. sodium chloride, and 45 Cc. of a 2:1 mixture of chloroform and ethyl alcohol was found to be 0.528.

The value for *d* between water and chloroform-amyl alcohol mixtures was 0.345.

Quinine.—Between water made alkaline with ammonium hydroxide and chloroform, quinine was found to possess such a low distribution coefficient that three washings of a 50 Cc. aqueous solution with 10 Cc. of chloroform were found to remove all of the alkaloid.

Strychnine.—The authors determined the distribution coefficients for systems containing chloroform alone and in a mixture with ether in order to see which would prove more efficient, as there has been a great difference of usage.

For the system, 100 Cc. of water, 2 Cc. of ammonium hydroxide, and 30 Cc. of chloroform, *d* was found to be equal to 0.003, but on substituting a mixture of 1:3 chloroform and ether, the value 0.087 was obtained.

SUMMARY OF THE HISTORICAL CHAPTER.—In looking over the work that has been published on the subject of the quantitative estimation of the alkaloids by the shaking-out process, sufficient data will be found to establish the equilibrium conditions of the systems, alkaloidal hydrochlorides or sulphates between their acid solutions and chloroform or ether. Results are lacking, however, which will show the partition of alkaloidal tartrates between tartaric acid and those solvents.

In addition the whole subject of the extraction of an alkaloid from its solution in chloroform by an acid has never been investigated. If equilibrium is reached, this should give the same value as with the extraction of the acid salt solution by that solvent. In practice, it takes a long time with some of these systems and there are certain other factors entering in.

III. THEORETICAL CONSIDERATION.

In an acid solution of a neutral alkaloidal salt the following equilibria are established:

(*a*) The alkaloidal salt is in equilibrium with the free alkaloid and acid, due to the hydrolysis of the salt, and

(*b*) The neutral salt and acid are in equilibrium with an acid salt. It is possible that more than one acid salt may be formed, in which case there will be as many more equilibrium reactions as there are acid salts formed. If chloroform is added to this system, and the mixture shaken, each of these equilibria may be affected. For example, the mass law equation for the hydrolysis of an alkaloidal salt is expressed by the following:

$$\frac{C_{\text{alkaloid}} \times C_{\text{acid}}}{C_{\text{salt}} \times C_{\text{water}}} = k,$$

where k is the mass law constant. The removal of one of the constituents will cause a resultant shift in the other concentrations in order that k may remain constant. The presence of a great excess of acid will drive back the hydrolysis by increasing the value for the term C_{acid} with the resultant decrease in value for the term $C_{alkaloid}$. At the same time, solution of the alkaloid in chloroform will cause a decrease in the value, $C_{alkaloid}$, with a resultant further lowering of C_{salt} in order to restore equilibrium. This salt which is removed is hydrolyzed. So the result of the removal of free alkaloid is to increase the hydrolysis. Thus, in this system at equilibrium the conditions existing are a resultant of these two equilibria which are progressing with opposite tendencies.

To approach the equilibrium from the other direction, however, introduces a new factor, namely, the speed of solution of the newly-formed salt in acid solution. As the two immiscible layers are being shaken together, forming an intimate mixture of alkaloid dissolved in chloroform and acid in the water, the alkaloid molecule in the chloroform and the acid molecule in the aqueous acid liquid meet at the junction of these fine drops of the two solutions, and combine.

In case the acid is monobasic, the first result of the reaction is probably the formation of a neutral salt. In an excess of acid, the acid salt is then formed.

With the dibasic acids, however, such as tartaric acid or sulphuric acid, the acid salt is formed first, similarly to the mechanism of the neutralization of sulphuric acid with sodium hydroxide. As more alkaloid combines, there is a gradual change from the acid salt into the neutral salt. The neutral salt in many cases seems to be very slowly soluble at ordinary temperatures, although it goes easily into solution at boiling temperature. With the excess of acid, however, the first acid salt is formed, which in some cases is only slightly soluble in a small excess of acid. As the excess of acid becomes greater, the soluble higher acid salts are formed. Thus the solution in acid may be hastened by shaking out with fresh portions of acid, in order to get the alkaloid as the higher acid salt. This situation would not be met with where the salt solution is shaken with chloroform or ether, for in these cases the salt is dissolved at a much higher temperature and the solution cooled.

IV. EXPERIMENTAL.

(*a*) Preparation of some alkaloidal tartrates and a brief description of their properties:

The neutral salts were prepared by dissolving the alkaloids in an aqueous acid solution, containing equivalent amounts of tartaric acid in a large excess of water, at the boiling temperature. In the excess of hot water, the acid salt which forms first stays in solution and the remainder of the alkaloid completely neutralizes it. On cooling the solution slowly, the neutral salt comes out in beautiful crystals. In one or two cases it was necessary to evaporate some of the solvent water in order to get the right concentration for crystallization.

The mon-acid salt may be prepared by dissolving the alkaloid in a slight excess of acid, in a small quantity of hot water. On cooling the crystals of the acid salt will come out.

These salts are further purified by crystallization from water several times.

In this way the crystalline salts of brucine, cinchonine, cinchonidine, quinine, morphine, and strychnine were prepared. The alkaloids aconitine, atropine, cocaine, codeine, and veratrine were obtained in the form of tartrates for further investigation by simply dissolving the alkaloids in the proper concentration of acid, as their tartrate salts were amorphous.

The neutral salts are characterized as follows:

(The amount of alkaloid present represents the percent alkaloid in the anhydrous salt.)

Strychnine:

M. P. 226°–227°, browning at 215°.
Crystalline form: beautiful white rosettes.
Analysis: 81.68 percent strychnine.
15.00 percent water.
Theoretical for $(C_{21}H_{22}N_2O_2)_2.C_4H_6O_6.8H_2O$:
81.66 percent strychnine.
15.20 percent water.

Brucine:

M. P. 236°–237°, with decomposition; browns at 210°.
Crystalline form: white cubes.
Analysis: 83.2 percent brucine.
9.1 percent water.
Theoretical for $(C_{23}H_{26}N_2O_4)_2.C_4H_6O_6.5H_2O$:
83.7 percent brucine.
8.8 percent water.

Quinine:

M. P. 199°, with browning.
Crystalline form: fine white needles.
Analysis: 81.28 percent quinine.
2.56 percent water.
Theoretical for $(C_{20}H_{24}N_2O_2)_2.C_4H_6O_6.H_2O$:
81.20 percent quinine.
2.3 percent water.

Cinchonidine:

M. P. 230°–231° with decomposition; browns at 218°.
Crystalline form: long white needles.
Analysis: 79.68 percent cinchonidine.
4.60 percent water.
Theoretical for $(C_{19}H_{22}N_2O)_2.C_4H_6O_62H_2O$:
79.69 percent cinchonidine.
4.64 percent water.

Cinchonine:

M. P. 190°, without either decomposition or browning.
Crystalline form: short white needles.
Analysis: 79.76 percent cinchonine.
2.8 percent water.
Theoretical for $(C_{19}H_{22}N_2O)_2.C_4H_6O_6.H_2O$:
79.69 percent cinchonine.
2.4 percent water.

The water of crystallization was determined by weighing the sample, heating at 110° to constant weight, and then dissolving the anhydrous salt in water. The solution was made alkaline and extracted twice with an excess of chloroform. The chloroform was evaporated and the residue heated to constant weight. The value obtained was that of the weight of the alkaloid in the sample of salt taken. From

the value of alkaloid and that of water of crystallization was calculated the formula of the salt. The one exception in this procedure was in the case of brucine where the residue from the chloroform extraction of the alkaline brucine solution was dissolved in standard acid and the excess acid titrated back with standard alkali.

The acid salts were analyzed in the same manner.

(*b*) Determination of the equilibrium conditions for the partition of the alkaloids and alkaloidal salts between aqueous neutral and acid solutions and an immiscible solvent (chloroform or ether):

1. Extraction of the neutral or acid aqueous alkaloidal solution with chloroform and ether:

0.2 Gm. of the neutral alkaloidal salt was dissolved in 25 Cc. of the aqueous acid solution of a definite concentration. To this were added 20 Cc. of chloroform or ether and the mixture was shaken in a Jena Erlenmeyer flask for two hours and a half, at a temperature of 25°. The shaking was carried out in a water thermostat, accurate to within a tenth of a degree. The time of shaking was chosen after experiments were carried out to determine the time required for the reaction to come to equilibrium. It was found that in the case of strychnine tartrate only half this time was required. When that time had elapsed, the flasks were removed, the layers at once separated, and the chloroform or ether layer put in a small separatory funnel. After standing for about 10 minutes in order to make a clear separation, 10 Cc. of the chloroform solution were measured into a porcelain casserole, and the chloroform evaporated on a steam-bath. The residue was taken up in 10 Cc. of $\frac{N}{50}$ sulphuric acid, and the excess acid titrated back with standard $\frac{N}{50}$ potassium hydroxide. Such indicators were used as would give the most accurate results for the individual alkaloids. The selection of indicator was made after reference to Kippenberger's article. The value obtained in this way gave the amount of free alkaloid present in the residue. The neutral solution was made alkaline and extracted with chloroform. After separation, the solvent was evaporated and the residue again taken up in standard acid and titrated back with standard alkali. This gave the value for the total alkaloid. By subtracting the first value from the second, the amount of alkaloid present, combined with acid in the form of salt, was obtained.

With morphine, a slightly different procedure was carried out. In determining the amount of total alkaloid, the neutral solution after the first titration was made alkaline with ammonium hydroxide, since sodium and potassium hydroxide form salts with morphine which are soluble in alkaline solution. The alkaline solution was then extracted with amyl alcohol, until it showed the absence of alkaloid, amyl alcohol being the best solvent for morphine which will answer the purpose.

The solutions of the neutral salts were of the following acid strengths: Neutral, $\frac{N}{8}$, $\frac{N}{4}$, $\frac{N}{2}$. The equilibrium conditions were determined for the tartrate salts of the alkaloids aconitine, atropine, cinchonidine, cinchonine, cocaine, codeine, quinine, morphine, strychnine and veratrine, in tartaric acid solutions. The equilibrium conditions for the solutions of alkaloidal sulphates in sulphuric acid and hydrochlorides in hydrochloric acid were worked out with the idea of supplementing and adding to those values obtained by Kippenberger and Simmer. Table IX gives the results of the extraction of the salt solution by chloroform, and Table X, the values obtained by the extraction with ether.

2. Conditions at equilibrium in systems in which the alkaloid is being removed from its chloroform solution by an acid.

TABLE IX.

Alkaloid.	Acid.	Strength.	Grammes alkaloid in 20 Cc. chloroform. Total.	Free.	Salt.	Indicator.
Strychnine	HTr	N/2	0	0	0	Azolitmin
	HTr	N/4	0	0	0	Azolitmin
	HTr	N/8	0	0	0	Azolitmin
	HTr	Neut.	0.0120	0.0104	0.0016	Azolitmin
	Sulph.	N/2	0	0	0	Azolitmin
	Sulph.	N/4	0	0	0	Azolitmin
	Sulph.	N/8	0	0	0	Azolitmin
	Sulph.	N/50	0	0	0	Azolitmin
	Sulph.	Neut.	0.0127	0.0127	0	Azolitmin
	HCl	N/2	0.0522	0	0.0522	Azolitmin
	HCl	N/4	0.0424	0	0.0424	Azolitmin
	HCl	N/8	0.0394	0	0.0394	Azolitmin
		Neut.	0.0085	0.0081	0.0005	Azolitmin
Brucine	HTr	N/2	0	0	0	Azolitmin
	HTr	N/4	0	0	0	Azolitmin
	HTr	N/8	0.0026	0.0026	0	Azolitmin
	HTr	Neut.	0.0076	0.0076	0	Azolitmin
	Sulph.	N/2	0	0	0	Azolitmin
	Sulph.	N/4	0	0	0	Azolitmin
	Sulph.	N/8	0	0	0	Azolitmin
	Sulph.	Neut.	0.0143	0.0143	0	Azolitmin
Cinchonidine	HTr	N/2	0.0012	0.0012	0	Azolitmin
	HTr	N/4	0.0024	0.0024	0	Azolitmin
	HTr	N/8	0.0018	0.0018	0	Azolitmin
	HTr	Neut.	0.0024	0.0024	0	Azolitmin
	Sulph.	N/2	0	0	0	Azolitmin
	Sulph.	N/4	0	0	0	Azolitmin
	Sulph.	N/8	0	0	0	Azolitmin
	Sulph.	Neut.	0.0086	0.0086	0	Azolitmin
Cinchonine	HTr	N/2	0	0	0	Azolitmin
	HTr	N/4	0	0	0	Azolitmin
	HTr	N/8	0	0	0	Azolitmin
	HTr	Neut.	0.0016	0	0.0016	Azolitmin
Caffeine	Sulph.	N/2	0.1928	0.1928	0	weight of residue
	Sulph.	N/4	0.1930	0.1930	0	weight of residue
	Sulph.	N/8	0.1300	0.1300	0	weight of residue
	Sulph.	Neut.	0.1032	0.1032	0	weight of residue
Cocaine	HCl	N/2	0	0	0	Iodeosin
	HCl	N/4	0	0	0	Iodeosin
	HCl	N/8	0.0432	0.0432	0	Iodeosin
	HCl	Neut.	0.0432	0	0.0432	Iodeosin
Codeine	HTr	N/2	0	0	0	Azolitmin
	HTr	N/4	0	0	0	Azolitmin
	HTr	N/8	0.0018	0.0018	0	Azolitmin
	HTr	Neut.	0.0046	0.0046	0	Azolitmin
Quinine	HTr	N/2	0.0014	0	0.0014	Azolitmin
	HTr	N/4	0.0028	0.0014	0.0014	Azolitmin
	HTr	N/8	0.0018	0.0014	0.0014	Azolitmin
	Neutral salt but slightly soluble in water.					
	Sulph.	N/2	0	0	0	Azolitmin
	Sulph.	N/4	0	0	0	Azolitmin
	Sulph.	N/8	0	0	0	Azolitmin
	Sulph.	Neut.	0	0	0	Azolitmin
Aconitine	HTr	N/2	0	0	0	Cochineal
	HTr	N/4	0.0537	0	0.0537	Cochineal
	HTr	N/8	0.0099	0	0.0099	Cochineal
	HTr	Neut.	0.0236	0.0136	0.0099	Cochineal
Atropine	HTr	N/2	0	0	0	Cochineal
	HTr	N/4	0.0036	0.0036	0	Cochineal
	HTr	N/8	0.0038	0.0010	0.0028	Cochineal
	HTr	Neut.	0.0018	0.0018	0	Cochineal
Morphine	HTr	N/2	0	0	0	Cochineal
	HTr	N/4	0	0	0	Cochineal
	HTr	N/8	0	0	0	Cochineal
	HTr	Neut.	0	0	0	Cochineal
Veratrine	HTr	N/2	0.0049	0.0049	0	Cochineal
	HTr	N/4	0.0116	0.0116	0	Cochineal
	HTr	N/8	0.0112	0.0112	0	Cochineal
	HTr	Neut.	0.0294	0.0294	0	Cochineal

TABLE X[1].

Alkaloid.	Acid.	Strength.	Grammes alkaloid in 20 Cc. ether. Total.	Free.	Salt.	Indicator.
Strychnine	HTr	N/2	0	0	0	Azolitmin
	HTr	N/4	0	0	0	Azolitmin
	HTr	N/8	0	0	0	Azolitmin
	HTr	Neut.	0	0	0	Azolitmin
	Sulph.	N/2	0	0	0	Azolitmin
	Sulph.	N/4	0	0	0	Azolitmin
	Sulph.	N/8	0	0	0	Azolitmin
	Sulph.	Neut.	0.0027	0.8027	0.8027	Azolitmin
Brucine	HTr	N/2	0	0	0	Azolitmin
	HTr	N/4	0	0	0	Azolitmin
	HTr	N/8	0.0040	?	?	Azolitmin
	HTr	Neut.	0.0032	0.0032	0	Azolitmin
	Sulph.	N/2	0	0	0	Azolitmin
	Sulph.	N/4	0	0	0	Azolitmin
	Sulph.	N/8	0	0	0	Azolitmin
	Sulph.	Neut.	0	0	0	Azolitmin
Cinchonidine	HTr	N/2	0.0018	?	?	Azolitmin
	HTr	N/4	0.0018	?	?	Azolitmin
	HTr	N/8	0	0	0	Azolitmin
	HTr	Neut.	0.0024	0.0012	0.0012	Azolitmin
	Sulph.	N/2	0	0	0	Azolitmin
	Sulph.	N/4	0	0	0	Azolitmin
	Sulph.	N/8	0	0	0	Azolitmin
	Sulph.	Neut.	0.0040	0.0040	0	Azolitmin
Cinchonine	HTr	N/2	0	0	0	Azolitmin
	HTr	N/4	0	0	0	Azolitmin
	HTr	N/8	0.0014	?	?	Azolitmin
	HTr	Neut.	0.0023	0.0023	0	Azolitmin
Codeine	HTr	N/2	0	0	0	Azolitmin
	HTr	N/4	0	0	0	Azolitmin
	HTr	N/8	0	0	0	Azolitmin
	HTr	Neut.	0	0	0	Azolitmin
	Sulph.	N/2	0	0	0	Azolitmin
	Sulph.	N/4	0	0	0	Azolitmin
	Sulph.	N/8	0.0023	0	0.0023	Azolitmin
	Sulph.	Neut.	0	0	0	Azolitmin
Aconitine	HTr	N/2	0	0	0	Cochineal
	HTr	N/4	0	0	0	Cochineal
	HTr	N/8	0.0052	?	?	Cochineal
	HTr	Neut.	0.0060	0	0.0060	Cochineal
Atropine	HTr	N/2	0	0	0	Cochineal
	HTr	N/4	0.0011	?	?	Cochineal
	HTr	N/8	0.0014	?	?	Cochineal
	HTr	Neut.	0.0021	0	0.0021	Cochineal
Morphine	HTr	N/2	0	0	0	Cochineal
	HTr	N/4	0	0	0	Cochineal
	HTr	N/8	0	0	0	Cochineal
	HTr	Neut.	0	0	0	Cochineal
	Sulph.	N/2	0	0	0	Cochineal
	Sulph.	N/4	0	0	0	Cochineal
	Sulph.	N/8	0.0011	0.0011	0	Cochineal
	Sulph.	Neut.	0.0019	0.0019	0	Cochineal
Quinine	HTr	N/2	0	0	0	Azolitmin
	HTr	N/4	0	0	0	Azolitmin
	HTr	N/8	0.0014	?	?	Azolitmin
	Sulph.	N/2	0	0	0	Azolitmin
	Sulph.	N/4	0	0	0	Azolitmin
	Sulph.	N/8	0	0	0	Azolitmin
	Sulph.	Neut.	0	0	0	Azolitmin
Veratrine	HTr	N/2	0	0	0	Cochineal
	HTr	N/4	0	0	0	Cochineal
	HTr	N/8	0	0	0	Cochineal
	HTr	Neut.	0.0024	0.0024	0	Cochineal

[1] Owing to the solubility of tartaric acid in ether, it is impossible to say whether the salt is present in the ether in the free state or as salt, in the extraction from acid solution.

0.2 Gm. of the alkaloid were dissolved in 20 Cc. of chloroform and 25 Cc. of the required concentration acid added. The mixture was shaken for two hours and a half, in the same manner as was the previous case, at 25°. After separation of the two layers, the amount of alkaloid and alkaloidal salt in the chloroform layer was determined. The results are tabulated in Table XI. Owing to the insolubility of some of the alkaloids in ether, values were not always obtained for the use of this solvent. The chloroform solutions of the alkaloids were shaken out with sulphuric, hydrochloric and tartaric acids of the concentrations, $\frac{N}{2}$, $\frac{N}{4}$, $\frac{N}{8}$. In the case of strychnine, even more dilute acid solutions were used. In those cases where the salt formed is but slowly soluble in the acids, experiments were made to determine how many shakings would more quickly dissolve the salt, and what strength acid would be best.

TABLE XI.

Alkaloid.	Nature, volume, acid. Cc.		Strength.	Grammes alkaloid in 20 Cc. chloroform. Total.	Free.	Salt.	Indicator.
Aconitine	HTr	25	N/2	0	0	0	Cochineal
	HTr	50	N/4	0	0	0	Cochineal
	HTr	50	N/8	0	0	0	Cochineal
	HCl	25	N/2	0.0342	0	0.0342	Cochineal
	HCl	25	N/4	0.0257	0	0.0257	Cochineal
	HCl	25	N/8	0.0146	0	0.0146	Cochineal
Atropine	HTr	25	N/4	0.0146	0.0010	0	Cochineal
	HTr	25	N/8	0.0010	0.0010	0	Cochineal
Brucine	HTr	25	N/2	0	0	0	Azolitmin
	HTr	25	N/4	0	0	0	Azolitmin
	HTr	25	N/8	0.0014	0.0014	0	Azolitmin
	HTr	35	N/8	0	0	0	Azolitmin
	Sulph.	25	N/2	0	0	0	Azolitmin
	Sulph.	25	N/4	0.0008	0.0008	0	Azolitmin
	Sulph.	25	N/8	0.0012	0.0012	0	Azolitmin
	HCl	25	N/2	0.0768	0	0.0768	Azolitmin
	HCl	25	N/4	0.0583	0	0.0583	Azolitmin
	HCl	25	N/8	0.0445	0	0.0445	Azolitmin
Cinchonidine	HTr	25	N/2	0	0	0	Azolitmin
	HTr	50	N/4	0	0	0	Azolitmin
	HTr	50	N/8	0	0	0	Azolitmin
	Sulph.	25	N/2	0	0	0	Azolitmin
	Sulph.	25	N/4	0	0	0	Azolitmin
	Sulph.	25	N/8	0.0012	0.0012	0	Azolitmin
	HCl	25	N/2	0	0	0	Azolitmin
	HCl	25	N/4	0	0	0	Azolitmin
	HCl	25	N/8	0	0	0	Azolitmin
Cinchonine	HTr	25	N/2	0	0	0	Azolitmin
	HTr	25	N/4	0	0	0	Azolitmin
	HTr	25	N/8	0	0	0	Azolitmin
	Sulph.	25	N/2	0	0	0	Azolitmin
	Sulph.	25	N/4	0	0	0	Azolitmin
	Sulph.	25	N/8	0.0011	0.0011	0	Azolitmin
	HCl	25	N/2	0	0	0	Azolitmin
	HCl	25	N/4	0	0	0	Azolitmin
	HCl	25	N/8	0	0	0	Azolitmin
Cocaine	HTr	25	N/2	0	0	0	Cochineal
	HTr	25	N/4	0	0	0	Cochineal
	HTr	25	N/8	0.0017	0.0017	0	Cochineal
	Sulph.	25	N/2	0	0	0	Cochineal
	Sulph.	25	N/4	0	0	0	Cochineal
	Sulph.	25	N/8	0	0	0	Cochineal
	HCl	25	N/2	0	0	0	Cochineal
	HCl	25	N/4	0	0	0	Cochineal
	HCl	25	N/8	0	0	0	Cochineal

TABLE XI.—*Continued.*

Alkaloid.	Nature, acid.	volume, Cc.	Strength.	Grammes alkaloid in 20 Cc. chloroform. Total.	Free.	Salt.	Indicator.
Codeine	HTr	25	N/2	0	0	0	Azolitmin
	HTr	25	N/4	0	0	0	Azolitmin
	HTr	25	N/8	0	0	0	Azolitmin
	Sulph.	25	N/2	0	0	0	Azolitmin
	Sulph.	25	N/4	0	0	0	Azolitmin
	Sulph.	25	N/8	0	0	0	Azolitmin
	HCl	25	N/2	0	0	0	Azolitmin
	HCl	25	N/4	0	0	0	Azolitmin
	HCl	25	N/8	0	0	0	Azolitmin
Quinine	HTr	25	N/2	0	0	0	Azolitmin
	HTr	25	N/4	0	0	0	Azolitmin
	HTr	25	N/8	0	0	0	Azolitmin
	Sulph.	25	N/2	0	0	0	Azolitmin
	Sulph.	25	N/4	0	0	0	Azolitmin
	Sulph.	25	N/8	0	0	0	Azolitmin
	HCl	25	N/2	0	0	0	Azolitmin
	HCl	25	N/4	0	0	0	Azolitmin
	HCl	25	N/8	0	0	0	Azolitmin
Strychnine	HTr	50	4N	0	0	0	Azolitmin
	HTr	100	2N	0	0	0	Azolitmin
	HTr	100	N	0.0011	0	0.0011	Azolitmin
	HTr	100	N/2	0.0011	0	0.0011	Azolitmin
	HTr	95	N/4	0.0011	0	0.0011	Azolitmin
	HTr	75	N/8	0.0011	0	0.0011	Azolitmin
	HTr	75	N/12	0.0029	0	0.0029	Azolitmin
	HTr	25	N/25	0.0125	0	0.0125	Azolitmin
	HCl	25	N/2	0.0202	0	0.0202	Azolitmin
	HCl	25	N/4	0.0250	0	0.0250	Azolitmin
	HCl	25	N/8	0.0202	0	0.0202	Azolitmin
Veratrine	HTr	25	N/2	0.0020	0.0020	0.0020	Cochineal
	HTr	25	N/4	0.0040	0.0040	0	Cochineal
	HTr	25	N/8	0	0	0	Cochineal
	Sulph.	25	N/2	0	0	0	Cochineal
	Sulph.	25	N/4	0	0	0	Cochineal
	Sulph.	25	N/8	0	0	0	Cochineal
	HCl	25	N/2	0.0740	0	0.0740	Cochineal
	HCl	25	N/4	0.0516	0	0.0516	Cochineal
	HCl	25	N/8	0.0426	0	0.0426	Cochineal

(*c*) Calculation of the *extraction factors* under the various equilibrium conditions examined, as well as those reported in the literature:

The *extraction factor* is simply the ratio of the amount of alkaloid found in the layer of the added solvent to the amount originally present in the first solution, regardless of the volumes of the two solutions. This gives an excellent idea of the efficiency of the different sets of extraction conditions.

Table XII contains the data and values for the extraction factors for the alkaloidal tartrates between tartaric acid and chloroform. In Table XIII will be found similar values where ether has been used as the solvent. The extraction factors for the sulphates between sulphuric acid and chloroform and of the hydrochlorides between hydrochloric acid and chloroform are found in Tables XIV and XV, respectively. Table XVI contains the values, using ether for the solvent, for the sulphates.

The extraction factors for the extraction of the alkaloids from their chloroform solutions, by tartaric, sulphuric and hydrochloric acids, will be found in Table XVII.

TABLE XII.

Alkaloid.	Acid.	Strength.	Chloroform. Volume.	Chloroform. Alkaloid.	Acid volume.	Original total alkaloid.	Factor.
Strychnine	HTr	N/2	20	0	25	0.1650	0
	HTr	N/4	20	0	25	0.1650	0
	HTr	N/8	20	0.0104	25	0.1650	0.0634
	HTr	Neut.	20	0.0126	25	0.1650	0.0768
Brucine	HTr	N/2	20	0	25	0.1680	0
	HTr	N/4	20	0	25	0.1680	0
	HTr	N/8	20	0.0026	25	0.1680	0.0154
	HTr	Neut.	20	0.0076	25	0.1680	0.0453
Cinchonidine	HTr	N/2	20	0.0012	25	0.1595	0.0076
	HTr	N/4	20	0.0024	25	0.1595	0.0153
	HTr	N/8	20	0.0018	25	0.1595	0.0114
	HTr	Neut.	20	0.0024	25	0.1595	0.0153
Cinchonine	HTr	N/2	20	0	25	0.1595	0
	HTr	N/4	20	0	25	0.1595	0
	HTr	N/8	20	0	25	0.1595	0
	HTr	Neut.	20	0.0016	25	0.1595	0.0100
Quinine	HTr	N/2	20	0.0014	25	0.1625	0.0086
	HTr	N/4	20	0.0028	25	0.1625	0.0172
	HTr	N/8	20	0.0028	25	0.1625	0.0172
Aconitine	HTr	N/2	20	0	25	0.1930	0
	HTr	N/4	20	0.0053	25	0.1930	0.0274
	HTr	N/8	20	0.0099	25	0.1930	0.0512
	HTr	Neut.	20	0.0360	25	0.1930	0.1240
Atropine	HTr	N/2	20	0	25	0.1585	0
	HTr	N/4	20	0.0036	25	0.1585	0.0217
	HTr	N/8	20	0.0039	25	0.1585	0.0245
	HTr	Neut.	20	0.0018	25	0.1585	0.0108
Codeine	HTr	N/2	20	0	25	0.1600	0
	HTr	N/4	20	0	25	0.1600	0
	HTr	N/8	20	0.0018	25	0.1600	0.0116
	HTr	Neut.	20	0.0046	25	0.1600	0.0286
Morphine	HTr	N/2	20	0	25	0.1585	0
	HTr	N/4	20	0	25	0.1585	0
	HTr	N/8	20	0	25	0.1585	0
	HTr	Neut.	20	0	25	0.1585	0
Veratrine	HTr	N/2	20	0.0049	25	0.1775	0.0276
	HTr	N/4	20	0.0116	25	0.1775	0.0645
	HTr	N/8	20	0.0112	25	0.1775	0.0630
	HTr	Neut.	20	0.0294	25	0.1775	0.1655

TABLE XIII.

Alkaloid.	Acid.	Strength.	Chloroform. Volume.	Chloroform. Alkaloid.	Acid volume.	Original total alkaloid.	Factor.
Strychnine	HTr	N/2	20	0	25	0.1640	0
	HTr	N/4	20	0	25	0.1640	0
	HTr	N/8	20	0	25	0.1640	0
	HTr	Neut.	20	0	25	0.1640	0
Brucine	HTr	N/2	20	0	25	0.1680	0
	HTr	N/4	20	0	25	0.1680	0
	HTr	N/8	20	0.0040	25	0.1680	0.0238
	HTr	Neut.	20	0.0032	25	0.1680	0.0191
Morphine	HTr	N/2	20	0	25	0.1585	0
	HTr	N/4	20	0	25	0.1585	0
	HTr	N/8	20	0	25	0.1585	0
	HTr	Neut.	20	0	25	0.1585	0
Cinchonidine	HTr	N/2	20	0.0018	25	0.1595	0.0114
	HTr	N/4	20	0.0018	25	0.1595	0.0114
	HTr	N/8	20	0	25	0.1595	0
	HTr	Neut.	20	0.0024	25	0.1595	0.0153
Cinchonine	HTr	N/4	20	0	25	0.1595	0
	HTr	N/8	20	0	25	0.1595	0
	HTr	N/8	20	0.0014	25	0.1595	0.0087
	HTr	Neut.	20	0.0023	25	0.1595	0.0144

TABLE XIII.—*Continued.*

Alkaloid	Acid.	Strength.	Chloroform. Volume.	Chloroform. Alkaloid.	Acid volume.	Original total alkaloid.	Factor.
Quinine	HTr	N/2	20	0	25	0.1625	0
	HTr	N/4	20	0	25	0.1625	0
	HTr	N/8	20	0.0014	25	0.1625	0.0086
Codeine	HTr	N/2	20	0	25	0.1600	0
	HTr	N/4	20	0	25	0.1600	0
	HTr	N/8	20	0	25	0.1600	0
	HTr	Neut.	20	0	25	0.1600	0
Aconitine	HTr	N/2	20	0	25	0.1930	0
	HTr	N/4	20	0	25	0.1930	0
	HTr	N/8	20	0.0052	25	0.1930	0.0269
	HTr	Neut.	20	0.0060	25	0.1930	0.0310
Atropine	HTr	N/2	20	0	25	0.1585	0
	HTr	N/4	20	0.0011	25	0.1585	0.0069
	HTr	N/8	20	0.0014	25	0.1585	0.0088
	HTr	Neut.	20	0.0021	25	0.1585	0.0132
Veratrine	HTr	N/2	20	0	25	0.1775	0
	HTr	N/4	20	0	25	0.1775	0
	HTr	N/8	20	0	25	0.1775	0
	HTr	Neut.	20	0.0024	25	0.1775	0.0135

TABLE XIV.

Alkaloid.	Strength.	Chloroform volume.	Alkaloid.	Acid volume.	Total alkaloid.	Extraction factor.	References.
Strychnine	N/2	20	0	25	0.1745	0	Authors
	N/4	20	0	25	0.1745	0	Authors
	N/8	20	0	25	0.1745	0	Authors
	N/50	20	0	25	0.1745	0	Authors
	Neut.	20	0.0127	25	0.1745	0.0727	Authors
	.17N	50	Traces	70	0.2000	0	Kippenberger
	1 percent.	50?	Traces	50	0.2610	0	Simmer
	Neut.	50?	Traces	50	0.2610	0	Simmer
Brucine	N/2	20	0	25	0.1780	0	Authors
	N/4	20	0	25	0.1780	0	Authors
	N/8	20	0	25	0.1780	0	Authors
	Neut.	20	0.0143	25	0.1780	0.0803	Authors
	.17N	50	0.0020	70	0.2000	0.0100	Kippenberger
Cinchonidine	N/2	20	0	25	0.1715	0	Authors
	N/4	20	0	25	0.1715	0	Authors
	N/8	20	0	25	0.1715	0	Authors
	Neut.	20	0.0086	25	0.1715	0.0503	Authors
Quinine	N/2	20	0	25	0.1740	0	Authors
	N/4	20	0	25	0.1740	0	Authors
	N/8	20	0	25	0.1740	0	Authors
	Neut.	20	0	25	0.1740	0	Authors
	.034N	50	0	70	0.2000	0	Kippenberger
Atropine	.034N	50	0	70	0.2000	0	Kippenberger
	Neut.	50	0.0010	70	0.2000	0.0050	Kippenberger
Morphine	.034N	50	0	70	0.2000	0	Kippenberger
Aconitine	.255N	50	Traces	70	0.2000	0	Kippenberger
	.085N	50	0.0064	70	0.2000	0.0320	Kippenberger
	.017N	50	0.0130	70	0.2000	0.0650	Kippenberger
Veratrine	.017N	50	Traces	70	0.2000	0	Kippenberger
	N/40	50?	Traces	50	0.2150	0	Simmer
	Neut.	50?	0.0374	50	0.2150	0.1780	Simmer
Codeine	.034N	50	0	70	0.2000	0	Kippenberger
	N/49	50?	Traces	50	0.2470	0	Simmer
	Neut.	50?	0.0276	50	0.2470	0.1116	Simmer
Cocaine	.255N	50	0	70	0.2000	0	Kippenberger
	.017N	50	Traces	70	0.2000	0	Kippenberger
	Neut.	50?	0.0143	50	0.2640	0.0540	Simmer

TABLE XV.

Acid—Hydrochloric Acid:

Alkaloid.	Strength.	Chloroform volume.	Alkaloid.	Acid volume.	Total alkaloid.	Extraction factor.	References.
Strychnine.....	N/2	20	0.0522	25	0.080	0.2895	Authors
	N/4	20	0.0424	25	0.080	0.2360	Authors
	N/8	20	0.0394	25	0.080	0.2182	Authors
	Neut.	20	0.0085	25	0.080	0.0472	Authors
	6.75N	50	0.0920	70	0.200	0.4600	Kippenberger
	6.85N	50?	0.0233	50	0.2377	0.1020	Simmer
	2.74N	50?	0.0559	50	0.2377	0.2360	Simmer
	.274N	50?	0.0250	50	0.2377	0.1050	Simmer
	.027N	50?	0.0083	50	0.2377	0.0340	Simmer
	Neut.	50?	0.0158	50	0.2377	0.0665	Simmer
Brucine.....	.075N	50	0.0898	70	0.2000	0.4490	Kippenberger
Cocaine.....	N/2	20	0	25	0.1790	0	Authors
	N/4	20	0	25	0.1790	0	Authors
	N/8	20	0.0432	25	0.1790	0.2420	Authors
	Neut.	20	0.0432	25	0.1790	0.2420	Authors
	2.74N	50?	0.0075	50	0.2240	0.0335	Simmer
	.274N	50?	0.0045	50	0.2240	0.0210	Simmer
	.027N	50?	0.0037	50	0.2240	0.0165	Simmer
	Neut.	50?	0.0490	50	0.2240	0.4900	Simmer
	.017N	150	0.0021	70	0.2000	0.0110	Kippenberger
Atropine.....	.075N	50	0.0014	70	0.2000	0.0070	Kippenberger
	2.74N	50?	0.0028	50	0.2250	0.0124	Simmer
	.027N	50?	0	50	0.2250	0	Simmer
	Neut.	50?	0	50	0.2250	0	Simmer
Morphine.....	.075N	50	0	70	0.2000	0	Kippenberger
	1.37N	50?	0	50	0.2470	0	Simmer
	.027N	50?	0	50	0.2470	0	Simmer
	Neut.	50?	0.0045	50	0.2470	0.0182	Simmer
Aconitine.....	.030N	50	0.0971	70	0.2000	0.4850	Kippenberger
Veratrine.....	.075N	50	0.0807	70	0.2000	0.4035	Kippenberger
	2.74N	50?	0.1248	50	0.2110	0.5920	Simmer
	.027N	50?	0.0327	50	0.2110	0.1550	Simmer
	Neut.	50?	0.0530	50	0.2110	0.2520	Simmer
Codeine.....	.030N	50	Traces	70	0.2000	0	Kippenberger
	2.74N	50?	0.0079	50	0.2340	0.0338	Simmer
	.027N	50?	0.0015	50	0.2340	0.0064	Simmer
	Neut.	50?	0.0371	50	0.2340	0.0158	Simmer

TABLE XVI.

Acid—Sulphuric Acid:

Alkaloid.	Acid. strength.	Ether. Volume.	Ether. Alkaloid.	Acid volume.	Original total alkaloid.	Extraction factor.
Strychnine.....	N/2	20	0	25	0.1745	0
	N/4	20	0	25	0.1745	0
	N/8	20	0	25	0.1745	0
	Neut.	20	0.0027	25	0.1745	0.0055
Brucine.....	N/2	20	0	25	0.1780	0
	N/4	20	0	25	0.1780	0
	N/8	20	0	25	0.1780	0
	Neut.	20	0	25	0.1780	0
Morphine.....	N/2	20	0	25	0.1730	0
	N/2	20	0	25	0.1730	0
	N/8	20	0.0011	25	0.1730	0.0063
	Neut.	20	0.0019	25	0.1730	0.0010
Cinchonidine.....	N/2	20	0	25	0.1715	0
	N/4	20	0	25	0.1715	0
	N/8	20	0	25	0.1715	0
	Neut.	20	0.0040	25	0.1715	0.0237
Quinine.....	N/2	20	0	25	0.1740	0
	N/4	20	0	25	0.1740	0
	N/8	20	0	25	0.1740	0
	Neut.	20	0	25	0.1740	0
Codeine.....	N/2	20	0	25	0.1720	0
	N/4	20	0	25	0.1720	0
	N/8	20	0.0024	25	0.1720	0.0139
	Neut.	20	0	25	0.1720	0

TABLE XVII.

Alkaloid.	Acid.	Chloroform. Strength.	Chloroform. Volume.	Original alkaloid.	Acid volume.	Weight in acid alkaloid.	Extraction factor.
Aconitine	HTr	N/2	20	0.200	25	0.200	1.00
	HTr	N/4	20	0.200	50	0.200	1.00
	HTr	N/8	20	0.200	50	0.200	1.00
	HCl	N/2	20	0.200	25	0.165	0.830
	HCl	N/4	20	0.200	25	0.174	0.872
	HCl	N/8	20	0.200	25	0.186	0.930
Atropine	HTr	N/4	20	0.150	25	0.149	0.994
	HTr	N/8	20	0.200	25	0.199	0.996
Brucine	HTr	N/2	20	0.200	25	0.200	1.00
	HTr	N/4	20	0.200	25	0.200	1.00
	HTr	N/8	20	0.200	25	0.192	0.964
	HTr	N/8	20	0.200	25	0.200	1.00
	Sulph.	N/2	20	0.200	25	0.200	1.00
	Sulph.	N/4	20	0.200	25	0.199	0.996
	Sulph.	N/8	20	0.200	25	0.198	0.994
	HCl	N/2	20	0.200	25	0.1232	0.617
	HCl	N/4	20	0.200	25	0.1417	0.7088
	HCl	N/8	20	0.200	25	0.1555	0.777
Cinchonidine	HTr	N/2	20	0.200	25	0.200	1.00
	HTr	N/4	20	0.200	50	0.200	1.00
	HTr	N/8	20	0.200	50	0.200	1.00
	Sulph.	N/2	20	0.200	25	0.200	1.00
	Sulph.	N/4	20	0.200	25	0.200	1.00
	Sulph.	N/8	20	0.200	25	0.1988	0.996
	HCl	N/2	20	0.200	25	0.200	1.00
	HCl	N/4	20	0.200	25	0.200	1.00
	HCl	N/8	20	0.200	25	0.200	1.00
Cinchonine	HTr	N/2	20	0.200	25	0.200	1.00
	HTr	N/4	20	0.200	25	0.200	1.00
	HTr	N/8	20	0.200	25	0.200	1.00
	Sulph.	N/2	20	0.200	25	0.200	1.00
	Sulph.	N/4	20	0.200	25	0.200	1.00
	Sulph.	N/8	20	0.200	25	0.1998	0.998
	HCl	N/2	20	0.200	25	0.200	1.00
	HCl	N/4	20	0.200	25	0.200	1.00
	HCl	N/8	20	0.200	25	0.200	1.00
Cocaine	HTr	N/2	20	0.200	25	0.200	1.00
	HTr	N/4	20	0.200	25	0.200	1.00
	HTr	N/8	20	0.200	25	0.198	0.990
	Sulph.	N/2	20	0.200	25	0.200	1.00
	Sulph.	N/4	20	0.200	25	0.200	1.00
	Sulph.	N/8	20	0.200	25	0.200	1.00
	HCl	N/2	20	0.200	25	0.200	1.00
	HCl	N/4	20	0.200	25	0.200	1.00
	HCl	N/8	20	0.200	25	0.200	1.00
Codeine	HTr	N/2	20	0.200	25	0.200	1.00
	HTr	N/4	20	0.200	25	0.200	1.00
	HTr	N/8	20	0.200	25	0.200	1.00
	Sulph.	N/2	20	0.200	25	0.200	1.00
	Sulph.	N/4	20	0.200	25	0.200	1.00
	Sulph.	N/8	20	0.200	25	0.200	1.00
	HCl	N/2	20	0.200	25	0.200	1.00
	HCl	N/4	20	0.200	25	0.200	1.00
	HCl	N/8	20	0.200	25	0.200	1.00
Quinine	HTr	N/2	20	0.200	25	0.200	1.00
	HTr	N/4	20	0.200	25	0.200	1.00
	HTr	N/8	20	0.200	25	0.200	1.00
	Sulph.	N/2	20	0.200	25	0.200	1.00
	Sulph.	N/4	20	0.200	25	0.200	1.00
	Sulph.	N/8	20	0.200	25	0.200	1.00
	HCl	N/2	20	0.200	25	0.200	1.00
	HCl	N/4	20	0.200	25	0.200	1.00
	HCl	N/8	20	0.200	25	0.200	1.00

TABLE XVII—*Continued*

Alkaloid.	Acid.	Chloroform. Strength.	Chloroform. Volume	Original alkaloid.	Acid volume.	Weight in acid alkaloid.	Extraction factor
Strychnine.....	HTr	4N	20	0.200	50	0.200	1.00
	HTr	2N	20	0.200	100	0.200	1.00
	HTr	N	20	0.200	100	0.198	0.996
	HTr	N/2	20	0.200	100	0.198	0.996
	HTr	N/4	20	0.200	95	0.198	0.996
	HTr	N/8	20	0.200	75	0.198	0.996
	HTr	N/12	20	0.200	75	0.197	0.986
	HTr	N/25	20	0.200	25	0.187	0.938
	HCl	N/2	20	0.200	25	0.179	0.900
	HCl	N/4	20	0.200	25	0.175	0.875
	HCl	N/8	20	0.200	25	0.179	0.899
Veratrine.....	HTr	N/2	20	0.200	25	0.198	0.990
	HTr	N/4	20	0.200	25	0.196	0.990
	HTr	N/8	20	0.200	25	0.200	1.00
	Sulph.	N/2	20	0.200	25	0.200	1.00
	Sulph.	N/4	20	0.200	25	0.200	1.00
	Sulph.	N/8	20	0.200	25	0.200	1.00
	HCl	N/2	20	0.200	25	0.126	0.630
	HCl	N/4	20	0.200	25	0.148	0.742
	HCl	N/8	20	0.200	25	0.157	0.787

V. DISCUSSION OF RESULTS.

In looking over the tables, the following results will be observed:

Aconitine.—In the washing of a solution of aconitine tartrate with chloroform, it is seen that the more concentrated the acid is, the less alkaloid will be removed. Hydrolysis takes place in the neutral solution with the removal of about 11 percent of the alkaloid in the free state. Whatever alkaloid is removed from the acid solution is removed in the form of salt and not in the free state. Aconitine is also removed from solution in sulphuric acid, provided the acid is less than $\frac{N}{4}$ concentration, but in much smaller amounts than from tartaric acid. From hydrochloric acid solution the amount of alkaloid removed is in direct proportion to the strength of the acid and the alkaloid is almost entirely removed as the salt, showing that chloroform is a fairly good solvent for the hydrochlorides of aconitine.

Atropine.—The same phenomena will be observed in the cases of the sulphates and tartrates of atropine, namely, that as acidity increases, less alkaloid will be removed by ether or chloroform. With the hydrochlorides it is reversed, and as the strength of the acid increases, the amount of alkaloid removed increases, and it is removed as the salt.

Brucine.—Brucine is not removed from tartaric acid solutions of strength greater than $\frac{N}{4}$ by either chloroform or ether, although with a decrease in the concentration of the acid from that point down, there is increased hydrolytic action with the removal of the alkaloid in the uncombined state. Sulphuric acid retains the alkaloid from removal by either chloroform or ether from acid solution, and ether does not even extract any from the neutral solution. From a $\frac{N}{0.075}$ solution of the hydrochloride in hydrochloric acid, 45 percent of the alkaloid is removed by chloroform and most of it as the salt.

Cinchonidine and Cinchonine.—Cinchonidine, cinchonine, and quinine differ from the other alkaloids in that their hydrochlorides are insoluble in chloroform. Many of the hydrochlorides of the other alkaloids are soluble to a great extent in this solvent. The neutral tartrates and sulphates are hydrolyzed and the alkaloids removed by both ether and chloroform. Cinchonidine differs from cinchonine

in that the tartrates are hydrolyzed in acid solution and some of the alkaloid removed as free cinchonidine.

Quinine.—Quinine sulphate is neither hydrolyzed in neutral and acid solution nor is the salt soluble in either ether or chloroform. The neutral tartrate is only slightly soluble in water but the $\frac{N}{8}$ acid solution is hydrolyzed to a slight extent, giving up quinine in both the free and combined condition to chloroform and in the free state to ether.

Morphine.—Neither chloroform nor ether remove morphine from the neutral or acid solution of the tartrate. The neutral sulphate is slightly hydrolyzed and some free morphine found in the ether.

Strychnine.—Hydrolytic action takes place in the $\frac{N}{8}$ tartaric acid and neutral solution of the strychnine tartrate and some alkaloid is removed by the chloroform in the free state. Increase in acidity with both the sulphates and tartrates causes a decrease in the amount of alkaloid removed, the reverse being true in the case of the hydrochlorides.

Veratrine.—Veratrine is removed in appreciable amounts from the tartaric acid solution by chloroform, but only from the neutral solution by ether. Chloroform does not take up any of the alkaloid from the sulphuric acid, but appreciably lowers the concentration of the alkaloid in the hydrochloric acid solutions.

Codeine.—Neither ether nor chloroform will remove codeine from solution in $\frac{N}{2}$ or $\frac{N}{4}$ tartaric acid, but chloroform removes increasing amounts as the concentration of the acid decreases from that point on. The hydrochlorides are more soluble in chloroform the greater the concentration of the acid. Hydrolysis takes place in the neutral solutions and much codeine is removed.

In general, the following principles may be apparent in the foregoing:

1. The neutral sulphates and tartrates in aqueous solution are hydrolyzed to a certain extent with the subsequent formation of free alkaloid and acid. This alkaloid may be removed by the immiscible solvent.

2. With an increase in the acidity of the solution the hydrolytic action becomes less and the amount of alkaloid taken up in the free state decreases with the increase in acidity.

3. Many of the acid sulphates and tartrates are removed as salts to a slight degree by chloroform and ether.

4. The alkaloidal hydrochlorides tend to be quite soluble in chloroform, and in such cases the solubility increases with the acidity of the solution, in all the cases studied.

By means of this data, the following questions may be answered:

1. What conditions of acidity would completely remove the alkaloid from its chloroform solution?

2. Which solvent, chloroform or ether, can best be used for shaking out the neutral or acid solution of the alkaloidal tartrates or sulphates, without removing the alkaloid?

3. And which salts are least easily removed by chloroform or ether, and in what concentration of acid, either by hydrolysis or through the solubility of the salt itself in the immiscible solvent?

1. The best conditions of acidity for completely removing the alkaloids from the chloroform solution. Table XVIII gives the values for the extraction of 0.2 Gm. of the alkaloid from 20 Cc. of the solvent chloroform, by the different acids:

TABLE XVIII.

Alkaloid.	Acid.	Strength.	Volume.
Aconitine	HTr	N/8	2 portions of 25 Cc. each
Atropine	HTr	N/8	1 portion of 25 and 1 of 10 Cc.
Brucine	HTr	N/8	1 portion of 25 and 1 of 10 Cc.
Cinchonidine	HCl	N/8	25 Cc.
and			
Cinchonine	Sulph.	N/8	1 portion of 25 and 1 of 10 Cc.
Cocaine	Sulph.	N/8	25 Cc.
and			
Codeine	HCl	N/8	25 Cc.
Quinine	HCl	N/8	25 Cc.
	HTr	N/8	25 Cc.
	Sulph.	N/8	25 Cc.
Strychnine	HTr	N/8	3 portions of 25 Cc. each
Veratrine	HTr	N/8	25 Cc.
	Sulph.	N/8	25 Cc.

2. The best solvent for shaking out the neutral and acid solutions of the alkaloidal tartrates, without the loss of alkaloid:

TABLE XIX.

Alkaloid.	Solvent.	Strength HTr.	Percent alkaloid removed.
Aconitine	Ether	N/4	0
Atropine	Chloroform	Slightly acid	1.0
Brucine	Chloroform	N/8	1.5
Cinchonidine	Ether	Slightly acid	1.2
Cinchonine	Chloroform	N/8	0
Codeine	Ether	N/8	0
Quinine	Ether	N/8	0.8
Morphine	Either one	Slightly acid	0
Strychnine	Ether	Slightly acid	0
Veratrine	Ether	Slightly N/8	0

3. The salts that are least easily removed by chloroform or ether and the best concentration of acid:

TABLE XX.

	Chloroform.			Ether.		
Alkaloid.	Salts.	Strength acid.	Percent removed.	Salts.	Strength acid.	Percent removed.
Aconitine	Sulphate	N/4	0	Tartrate	N/4	0
	Tartrate	N/4	0			
Atropine	HCl	0.02N	0	Sulphate	N/10	0
Brucine	Sulphate	N/8	0	Sulphate	N/10	0
Cinchonine	Tartrate	N/8	0	Tartrate	N/8	0.8
Cinchonidine	Sulphate	N/8	0	Tartrate	N/8	0
Codeine	Sulphate	N/50	0	Sulphate	N/10	0
Quinine	Sulphate	N/50	0	Sulphate	N/10	0
Morphine	Sulphate	N/50	0	Tartrate	N/8	0
Strychnine	Sulphate	N/50	0	Tartrate	N/8	0
Veratrine	Sulphate	N/50	0	Tartrate	N/8	0

In addition, calculations may be made which will tell how many shakings from chloroform solution need be made by an acid to completely remove the alkaloid from the chloroform solution. If 94 percent of the alkaloid is removed in the first shaking with 25 Cc. of acid, the second extraction will remove 94 percent of the 6 percent left, or 5.86 percent. Thus these two extractions will remove 99.86 percent of the alkaloid. A third extraction will take away 94 percent of the remaining 0.14 percent, or 0.131 percent, so the three extractions with the acid will make practically a complete removal.

Table XXI shows the number of shakings necessary to remove 0.2 Gm. of alkaloid from 20 Cc. of a chloroform solution.

TABLE XXI.

Alkaloid.	Acid.	Strength.	Percent alkaloid removed in first shaking.	Number of shakings for complete removal.	Total acid volume.
Aconitine	HTr	N/2	100	1	25
	HTr	N/4	100	1	25
	HTr	N/8	100	1	25
	HCl	N/2	83.0	4	100
	HCl	N/4	87.2	3	75
	HCl	N/8	93.0	3	75
Atropine	HTr	N/4	99.4	2	35
	HTr	N/8	99.6	2	25
Brucine	HTr	N/2	100	1	25
	HTr	N/4	100	1	25
	HTr	N/8	96.4	2	35
	Sulph	N/2	100	1	25
	Sulph.	N/4	99.6	2	35
	Sulph.	N/8	99.4	2	35
	HCl	N/2	61.7	6	150
	HCl	N/4	70.8	5	125
	HCl	N/8	77.7	4	100
Cinchonidine	HTr	N/2	100	1	25
	HTr	N/4	100	1	25
	HTr	N/8	100	1	25
	HCl	N/2	100	1	25
	HCl	N/4	100	1	25
	HCl	N/8	100	1	25
	Sulph.	N/2	100	1	25
	Sulph.	N/4	100	1	25
	Sulph.	N/8	99.5	1	35
Cinchonine	HTr	N/2	100	1	25
	HTr	N/4	100	1	25
	HTr	N/8	100	1	25
	HCl	N/2	100	1	25
	HCl	N/4	100	1	25
	HCl	N/8	100	1	25
	Sulph.	N/2	100	1	25
	Sulph.	N/4	100	1	25
	Sulph.	N/8	99.8	2	35
Cocaine	HTr	N/2	100	1	25
	HTr	N/4	100	1	25
	HTr	N/8	99.0	2	35
	Sulph.	N/2	100	1	25
	Sulph.	N/4	100	1	25
	Sulph.	N/8	100	1	25
	HCl	N/2	100	1	25
	HCl	N/4	100	1	25
	HCl	N/8	100	1	25
Codeine	HTr	N/2	100	1	25
	HTr	N/4	100	1	25
	HTr	N/8	100	1	25
	Sulph.	N/2	100	1	25
	Sulph.	N/4	100	1	25
	Sulph.	N/8	100	1	25
	HCl	N/2	100	1	25
	HCl	N/4	100	1	25
	HCl	N/8	100	1	25
Quinine	HTr	N/2	100	1	25
	HTr	N/4	100	1	25
	HTr	N/8	100	1	25
	Sulph.	N/2	100	1	25
	Sulph.	N/4	100	1	25
	Sulph.	N/8	100	1	25
	HCl	N/2	100	1	25
	HCl	N/4	100	1	25
	HCl	N/8	100	1	25

TABLE XXI.—*Continued.*

Alkaloid.	Acid.	Strength.	Percent alkaloid removed in first shaking.	Number of shakings for complete removal	Total acid volume.
Strychnine.....	HTr	N	100	After 2 shakings of 25 Cc. each	
	HTr	N/2	100	After 4 shakings of 25 Cc. each	
	HTr	N	99.6	After 4 shakings of 25 Cc. each	
	HTr	N/2	99.6	After 4 shakings of 25 Cc. each	
	HTr	N/4	99.6	After 4 shakings (3×25+10Cc.)	
	HTr	N/8	99.6	After 3 shakings of 25 Cc. each	
	HTr	N/12	99.6	After 3 shakings of 25 Cc. each	
	HTr	N/25	93.8	After 1 shaking of 25 Cc.	
	For complete removal from N/25 acid, 2 shakings.				
	HCl	N/2	90.0	3	75
	HCl	N/4	87.5	3	75
	HCl	N/8	89.9	3	75
Veratrine.....	HTr	N/2	99.0	2	35
	HTr	N/4	98.0	2	35
	HTr	N/8	100.0	1	25
	HCl	N/2	63.0	6	150
	HCl	N/4	74.2	5	125
	HCl	N/8	78.7	4	100
	Sulph.	N/2	100	1	25
	Sulph.	N/4	100	1	25
	Sulph.	N/8	100	1	25

VI. SUMMARY.

1. The most practical method for the determination of alkaloids involves the extraction of the alkaloid from an aqueous solution by means of an immiscible solvent, such as chloroform or ether.

2. It further involves the purification of the alkaloidal solution by removal of gums, colors, etc., by similar methods.

3. Unless conditions are carefully guarded, loss of alkaloid as salt or in the free state will occur during the extraction.

4. The equilibrium conditions for the following systems have been established, in the case of the alkaloids aconitine, atropine, brucine, cinchonidine, cinchonine, cocaine, codeine, morphine, quinine, strychnine, and veratrine:

(*a*) The alkaloidal tartrates, tartaric acid, water and chloroform.

(*b*) The alkaloidal tartrates, tartaric acid, water and ether.

(*c*) Certain alkaloidal sulphates, sulphuric acid, water, and chloroform.

(*d*) Certain alkaloidal sulphates, sulphuric acid, water, and ether.

(*e*) Certain alkaloidal hydrochlorides, hydrochloric acid, water, and chloroform.

(*f*) The extraction factors have been determined for all these systems, as well as those described in the literature, and the most favorable conditions for extraction calculated.

LABORATORY OF ORGANIC ANALYSIS OF THE UNIVERSITY OF ILLINOIS.

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THE UNIFICATION OF CLINICAL LABORATORY METHODS.

BY FREDERIC E. NIECE, PH.D.

The extremely diverse findings so frequently revealed in various clinical laboratory reports have become so conflicting of late that criticism has been called forth and the need for a reform at the earliest possible date advocated. This would be desirable, at least in-so-far as methods and technics are concerned, so that some sort of agreement in the results could be obtained through a standardized set of tests for this line of work.

Speaking from experience, it seems almost impossible to secure reports on the same specimen from two or more independent laboratories that will agree on the essentials. This is particularly true in cases where confirmation or checking of results are desired. There appears to be no end to discrepancies, because of the fact that there is no attempt made to co-ordinate technics, nor a desire to establish a recognized set of methods by which to conduct the work.

Physicians, who, as a rule, depend upon the absolute truth of the results of analyses of this kind, have found so much fallacy in the work of a few "commercialized laboratories," that their suspicion has been aroused against practically all privately owned concerns. This condition of affairs has become aggravated within the last few years, because a few "contract laboratories" have abused their contract privileges by turning out unreliable work. Contracts, such as have been in vogue in recent years, constitute the greatest menace that confronts legitimate laboratory work. Physicians fell easy prey to the idea, because it looked like an innovation and a convenience, hence they readily accepted the proposition. But they have been constantly deceived, because they, or no one else, have had any satisfactory means with which to check this kind of work. For the present, any laboratory has a right to qualify their methods as being the best, because there are no other means of standardization than personal say-so. But so glaring have become the methods pursued by a few enterprises of this sort, that the Kings County Medical Society in conjunction with the New York County Medical Society, of New York city, have given wide publicity to a certain institution, which not only bids for contract laboratory work, but issues rebates, as well. Unfortunately, the law gives these medical societies no power to investigate such institutions, but by virtue of their code of ethics they can do much good by warning their members against such evils, and to that end, a movement is under way.

That private laboratories are a necessity cannot be denied, but they should endeavor to perform a well defined function, and be the equal, if not the superior, in their work of the public health laboratories. A public health laboratory is no guarantee against mistakes because it is dominated by civil service employees, but it does strive to obtain a condition of uniformity, which permits of its work being checked. This does not obtain with all privately conducted laboratories, owing to the lack of a desire to secure uniformity. It is for this reason, that sooner or later, the health department will see the need of controlling or regulating this line of work through legislation, or by a set of recognized methods of analyses. This is a project that should be encouraged. As to the purely commercialized clinical laboratory, we are aware that it is commonly accepted that "much shame has been committed in its name"; therefore, regulation of them may very soon be attempted.

While legal regulations may be necessary, they will act only as an expedient, and will not bring about the desired improvement unless there are means at disposal for checking such work. This is essential for arriving at truth and reliability, for

the continued success of laboratories depends on whether they do honest work or not, and the reliability of their methods. Such regulation would in a large measure curb contract activity, for unregulated contracts foster inaccuracy. Concerns of this kind, working only for the dollar, cannot afford to give the time sufficient to insure accuracy; frequently they do not see the need of it; chiefly because it is too expensive. Slipshod methods of inexperienced technicians will not be corrected by costly chemicals. Let us work to the end that clinical laboratory work will be accepted with the same degree of confidence in which an iron or a coal analysis is now received.

Some physicians have come to the conclusion that all laboratories "are tinted with the same pigment." If the laboratory methods for clinical purposes were harmonized, such views would be dispersed, and would serve as an incentive to the honest worker, and afford a means of assurance to those who are served by the laboratories. Under such conditions, no such a test as the "sink test" would survive the "acid test." The estimation of glucose in urine, from its specific gravity, would suddenly become obsolete. Such methods as detecting elements by the odor or color would not obtain very long under such conditions of checking. Discrepancies will continue, unless some means is adopted which will guarantee the use of reliable methods.

In support of the contention here advanced, reflect on the conditions prior to the inclusion of well established methods of identification in the Pharmacopœia. Within recent years, order has arisen out of chaos, so that to-day we can expect agreement in many things, and it matters not whether the drugs are examined in San Francisco or New York. As examples of unification of laboratory methods, the official methods of the Bureau of Chemistry of the Department of Agriculture may be cited; also the standard methods of water analysis and standard sewage analysis of the American Public Health Association; the Hygienic Laboratory methods for the determination of phenol-coefficients. By reason of these methods, there is some hope of checking the results, regardless of location of the laboratory, provided experienced workers made the examinations. There is no reason why this same condition should not exist with clinical laboratory work, when so much depends on the truth of the findings.

During the last fourteen years, I have experienced some amusing, yet sorrowful, instances, which vividly bespeak the need of some such reform as here advocated. During my connection with the laboratory of the Equitable Life Assurance Society of New York City a few interesting and hitherto unknown tests were encountered. I recall a few that were never known before, and have since been forgotten. One came from a western medical examiner who was constantly reporting glucose in urine. Tests made in the home laboratory proved the contrary in 98 percent of the cases. On asking for information as to his technic, he promptly replied that he used "Dr.——(?) test, which was a test in which blue litmus was used." He qualified his test by stating "If the color changed on boiling the mixture of urine and litmus, it was due to sugar, but if the color remained the same after boiling, there was no sugar present." Evidently he had confused his litmus test (?) with either that of Bremer's (methylene blue) or Fehling's test, impressed by the color, without looking up details. Another came from a Kansas examiner who used Fehling's solution for testing both for albumin and glucose in urine. His description of the test was, "that if on boiling the urine with Fehling's solution the color turns purple, it is due to albumin, but if it turns orange in color it is due to glucose," and he added, "there is no doubt about either." He was non-committal when asked how he would apply his test in the event both albumin and glucose were present in the same sample of urine.

A more recent occurrence was the following: A sample of urine (sp. gr. 1.028) was divided into two samples, to be tested for the presence of sugar; a portion was submitted to a contract laboratory, the other was carefully examined in another laboratory. By a most extended and careful technic, not as much as traces of glucose could be detected by the latter. The former reported 2.4 percent of glucose. As the variation in the two reports was so great the client made an investigation. He reported back that he was told by the contract laboratory, "they had made a test for glucose with Fehling's solution, and on finding a slight reduction, they polariscoped it and obtained the above reading" (slight reduction, mind you). When asked if they still had the specimen in their possession, they said, "No, they had thrown it away." I do not venture an explanation, for it is too deep for the average chemist to fathom (?), but it does point out the fact that such things could not occur if regulations were provided by which we could check work, or reject work, on the claim that an official or standard method was or was not used. Conceive, if you will, the great difference that may follow microscopic work when one chemist uses only a drop of the sample for an examination and the other the same size drop after centrifuging. Surely no agreement can follow such technic, and in a sense both are acceptable.

One of the most glaring defects in our so-called "clinical laboratory work" is the ease with which reports go unchallenged. The following is a report sent out by a New York physician to a patient of another doctor, who requested that he make a careful examination of the urine specimen. I do not give this with any desire to cast a reflection on the medical profession, but what I am endeavoring to do is to champion a cause which will prevent dishonesty and carelessness in making examinations. There were no means of checking this analysis, but the result of the examination will speak for itself. This was the report taken verbatim.

Dr. Mc——. Patient, Mr. B——.

Odor, urinous. Specific gravity, 1.020. Color, yellow. Reaction, acid. Sediment, large amount. Glucose, absent. Albumin, present. Bile, none. Urea, none. Chlorides, normal. Phosphates, normal.

Microscopically, few hyaline casts, numerous oxalate of calcium crystals.

Remarks: Great care must be exercised with diet, or stones may form.

[Signed] ———— M.D.

In all my experience of testing thousands of samples of urine yearly, I have never as yet seen a urine, such as this one purports to be, with a normal gravity, that did not reveal some measurable amounts of urea. What method was used in this examination I am unable to state, but I am much at sea to understand what became of all the urea. Granting the use of the accepted "hypobromite method," better figures should have been obtained, but it appears, from the report, all the urea had vanished. In support of this very remarkable finding, I have only two explanations to offer—one is dishonesty, the other carelessness—one or both are at fault.

To be brief, too many examinations are made inferentially and not chemically. With these few examples taken at random from a large number, one must realize the very great need of some form of uniformity. Just as to how this may be put into shape, I am not at this time prepared to state, but it occurs to me, that in the United States Pharmacopœia would be the proper place to make a beginning. As an initial step in this direction, I may add by way of reference, that I advocated, in a paper read at the fifty-seventh annual meeting of the American Pharmaceutical Association, held at Los Angeles, California, August, 1909, the inclusion in the National Formulary of a set or a list of recognized formulas that would be of special use in such distinct studies as bacteriology, hematology, pathology, gas-

trology and urinology. Something on the order of the Swiss Pharmacopœia, which contains a chapter of five pages on "Reagents for Medical Chemistry." The formulary of the Dresden Apotheker Verein gives solutions for the estimation of albumin, glucose, etc. The Russian Pharmacopœia gives a long list of formulas for use in medical chemistry. For a number of years, the United States Pharmacopœia has recognized Fehling's solution as a standard for the estimation of glucose and allied carbohydrates. Within the last year or so, the idea suggested above has been slowly assuming form. The U.S.P. IX contains a chapter in Part II on Diagnostical Reagents and Clinical Tests, giving formulas, etc., of reagents for examination of urine, gastric contents, and blood; also stains and accessories for bacterial study. In addition to this, the A. Ph. A. Recipe Book will contain other tests that have been and will be submitted by various correspondents. The question is, how can the good work begun be promoted?

Now that the United States Pharmacopœia has taken the first step, much has already been accomplished. It must be conceded, that to agree upon a set of standard methods will be no easy undertaking, and fraught with much discussion. It is reasonable to expect this, as each contributor will advance some particular method or test as being the best, by reason of his personal experience with it. Then again the test will be made somewhat difficult at the outset, because methods are constantly changing, undergoing revision, modification, improvement, or deletion. This should not impede the progress of the idea, since we would find many tests that could be selected for the purpose intended, by virtue of their long usage. These would form a working basis upon which to extend the subject, which would eventually lead to a set of standard methods that would certainly insure more uniform and reliable results in the examination of clinical specimens for diagnostic purposes.

The Claremont Laboratories, New York City.

STUDENTS WHO MEAN BUSINESS.

Not long ago we were told that the enrollment for the summer classes at the University exceeded all expectations, and now comes the news that more than 8000 students have registered for the summer school of Columbia University, in New York. These figures are more than impressive. They stand for just that many young men and women who are terribly in earnest, which is only another way of saying that most of them intend to succeed in the world if it is possible to do so. It is no longer remarkable to go through school or college. In these days of compulsory education few escape the earlier grades, and those who are able to raise the price manage to get at least a smattering of what we call the higher education. Many of those who go to college come out not much better equipped for life.

But who can doubt the advantages that will be gained by the tens of thousands who are entering the summer classes of the various colleges throughout the United States. The fact that they are willing to undergo the sweltering discomforts of this season of the year is a proof that they have the stamina of which successful men are made. The competition of life grows more strenuous as the years go by, and it is obvious that the greatest prizes will go to these who are best equipped for the battle.

The day of opportunity has not passed in this country and none realize it more clearly than the ambitious, persistent young people who are willing to make any sacrifices in order to obtain the best education possible.—*Phila. Inquirer.*

HANDLING BIOLOGICAL PRODUCTS IN THE DRUG STORE.*

BY ROBERT P. FISCHELIS.

Biological products are playing such an important role in the materia medica of the present day that the pharmacist should be alive to the possibilities afforded him of making his establishment known to physicians as one at which these products may be obtained in first-class condition at any time, together with general information as to their administration and use.

As pointed out by Mr. W. L. Cliffe, in a paper presented to the Philadelphia Branch of the American Pharmaceutical Association in 1912, the pharmacist logically and naturally is the recognized distributor of bacteriological products, because the time that would elapse in procuring them direct from the maker every time they are needed by the physician would bring about serious inconvenience. Most pharmacists handle bacteriological products nowadays, although a great many confine themselves to keeping a few packages of vaccine virus and diphtheria antitoxin on hand, because they have not yet learned the possibilities of financial remuneration connected with making their establishments headquarters for all kinds of bacteriological products.

In order to take up biological products as a side line, the pharmacist should know something of their nature, manufacture, keeping qualities and administration and be able to assist the physician in the selection of the proper serum or bacterin that may be required. Further, he should select the products of a reliable house so that he may have the confidence necessary to enable him to recommend these products to physicians. The pharmacist must also bear in mind that no matter how excellent a product may be when he receives it from the manufacturer, his (the pharmacist's) reputation depends on the condition in which the product leaves the drug store. The question of proper storage, therefore, is a very vital one.

It is a well-known fact that bacteriological products depend for their activity upon highly complex and delicate protein compounds and must in consequence be subject to deterioration. Such changes may be chemical, resulting from the gradual degeneration of the active chemical constituents, as in the case of antitoxins. On the other hand, the active constituent may be a living microörganism and deterioration of the product containing it may be due to an effort at continued growth, with resultant exhaustion of the food supply, or to the accumulation of metabolic products—naturally, one of these processes is somewhat dependent upon the other, and together they weaken and destroy the life of the active constituent more or less rapidly in a length of time depending upon the conditions under which the product is kept. A typical example of this class is smallpox vaccine virus. The studies of prominent bacteriologists reveal that cold is the most important factor known at present for the preservation of biological materia medica.

Elgin studied the rate of deterioration of vaccine virus when exposed to various temperatures: He found that at 37°C. (98°F.) the vaccine is dead within three or four days; at 21°C. (70°F.) it will live for from one to three weeks; at 10°C. (50°F.) it is still active after three to six months; while at 12°C. (10°F.) it will retain its activity for more than four years, perhaps indefinitely. This work has been confirmed by others. It is thus plainly seen that even at ordinary refrigerator temperature, vaccine virus retains its activity for only a few months, and, owing

* Read at the meeting of the Pennsylvania Pharmaceutical Association, June 20, 1916.

to variability in the virus obtained at different seasons, etc., the dating on the finished tubes or points is usually only from six weeks to two months from the date of preparation.

As said above, the substance in antitoxic or antibacterial serums which gives them their specific value is subject to deterioration, and it has been found that upon keeping serums for a considerable time they lose strength. Light and heat are the most potent agencies in bringing about this change. It is customary to protect all biological products from light by putting them up in dark glass containers. Actual experience and actual scientific experiment have demonstrated the value of cold for the preservation of the specific activity of serums, and it has been found by scientists who have studied the rate of deterioration of various serums that some antitoxins deteriorate a great deal under the ordinary conditions of the market, while others suffer very little change. They all, however, point out the fact that loss in potency does not result in the formation of any harmful substance.

On account of this deterioration, it is customary for manufacturers of antitoxins to place in their packages an excess of units of strength, sufficient to make up for the average maximum loss in potency during a time, the limit of which is noted on the package.

The rate of deterioration under the conditions of the market as estimated by Kinyoun and Hitchens is such that an excess of 24 percent in units should be added, if the serum is to remain on the market for twelve months.

Anderson thinks that 33⅓ percent for two years is sufficient, and American manufacturers follow this rule pretty closely. In other words, a package of diphtheria antitoxin said by the manufacturer to contain ten thousand units at the time it is placed on the market will actually contain sufficient excess to allow for 33⅓ percent deterioration during two years' exposure to the average conditions of the market.

If the pharmacist is keeping his biological products under the best conditions, the deterioration will be much less than 33⅓ percent, and even though the patient receives it at the end of two years, he will get much more than ten thousand units, and since the therapeutic result depends directly upon the number of units administered, the result will be proportionately better.

It may be assumed that tetanus antitoxin and the antibacterial serums deteriorate, if not in the same ratio, at least similarly with regard to cold. Therefore, the value of refrigeration as an indispensable aid in serum therapy is clearly demonstrated.

From what is already known of the rate of deterioration of antitoxins when kept at a low temperature, we may deduce that cold affects bacterial vaccines (bacterins) much as it does serums, that is, it has a preservative influence. No extensive experiments to determine the degree of deterioration in bacterial vaccines have yet been completed. Information regarding the danger of deterioration of bacteriological products has been freely circulated, and pharmacists should be well acquainted with the facts in the case. Yet there are some who disregard not only the facts placed before them in current pharmaceutical literature, but the directions explicitly given in the United States Pharmacopœia.

The Ninth Revision of the Pharmacopœia will recognize, besides diphtheria antitoxin, which was recognized in the Eighth Revision, tetanus antitoxin and vaccine virus. The following directions are given for the preservation of antitoxin: "It must be kept in sealed glass containers in a dark place, at a temperature between 4.5° and 15°C."

The directions for the preservation of vaccine virus are: "Preserve it at a

temperature between 4.5° and 15°C.; protect it from light." In each case, the Pharmacopœia also states that the serum or vaccine must bear the "name, address and license number of the manufacturer and the date beyond which the product cannot be expected to yield its specific results."

Since the foregoing facts are known and the directions of the Pharmacopœia are so specific, it behooves pharmacists to regulate their facilities for storing biological products accordingly, and the apothecary who does not keep his stock of antitoxins, bacterins and vaccine virus in a refrigerator or cold store room is as far behind the times as the surgeon who prepares his scalpel for an operation by sharpening it upon his boot.

Since the Committee on Papers and Queries of this Association published its annual list of queries, it has been my privilege to visit the establishments of several Philadelphia pharmacists which are provided with biological refrigerators, and by their courtesy I am permitted to discuss some of the methods in vogue in taking care of biological business in the retail store, in answer to Query No. 9.

The majority of the stores visited were equipped with a Mulford Biological Refrigerator, which is specially constructed of enameled steel to meet the needs of storing these products. It consist essentially of two properly insulated chambers, the upper one being used for ice and the lower one being divided into eight separate compartments arranged in the form of drawers, thus permitting storage of each kind of bacteriological products exclusively in one or more of the compartments. A fairly good sized piece of ice will maintain a temperature below 40°F. in this refrigerator very easily, and this temperature comes well within the pharmacopœial requirements.

In several of the stores visited, no further attempts at systematizing the stock of these products in the refrigerator are made than to see that as each order comes in, the product is put away under its proper classification. At periodic intervals, someone goes over the entire stock and takes note of the expiration dates on the packages and sorts out those which have reached the time limit and prepares to exchange or return them for credit. While this method is fairly satisfactory for a store which does not do a very large business in biological products and is so situated that any desired package can be obtained at very short notice by sending to the manufacturing house, it is not satisfactory for stores which are located at some distance from the source of supply.

In the Farrow Pharmacy, Twenty-ninth Street and Columbia Avenue, Philadelphia, a scheme is followed by which the stock on hand is kept account of as well as of the dates of expiration, with very little trouble. Pieces of plain white cardboard are ruled as shown below, and placed in each compartment of the refrigerator.

Name	*A*	*B*	*C*	*D*	*E*
Acne Serobacterin	7– 8–16				
Influenza Serobacterin.....	8–16–16	8–16–16	8–16–16	8–16–16	
	9– 7–16				
Neisser Serobacterin.....	9–20–16	9–20–16			
	9–20–16	9–20–16			
	10– 7–16		10– 7–16		

In the column at the extreme left, the name of the antitoxin, bacterin or whatever it may be is written with pencil. In the column immediately adjoining, *A*, the expiration date of the package is written. If two or more packages of the same product are in stock, two or more expiration dates are written in this column. The

card, therefore, not only serves as a memorandum of expiration dates, but also becomes an inventory of the particular compartment to which it refers. Each time a package is removed, its date of expiration is erased from the card, so that, if properly kept, one need simply glance at the card to see how many packages of each product are on hand and how soon they must be exchanged.

The columns headed *B, C, D* and *E* are used to record expiration dates of different sizes of the product recorded on the same line in column *A*.

The most complete system of storing and keeping track of biological products that I have seen in any retail drug store in Philadelphia is that followed in Peacock's Pharmacy at Broad Street and Erie Avenue.

This store is known to physicians as headquarters for biological products, and with the many new preparations that constantly appear, the ordinary biological refrigerator is taxed for space, but Mr. and Mrs. Peacock and their assistants have mastered the problem of storing a maximum amount of biological products in a minimum of space.

Instead of laying packages of the various products in the compartments promiscuously, the ordinary packages with square ends are stood on end, in alphabetical or numerical order, with the date up, in rows separated by neat cardboard partitions. Four-syringe packages of bacterins, because of lack of room elsewhere, are placed on specially adjusted narrow shelves arranged between the wall of the refrigerator and the wall of the drawer. The space here is just wide enough to store these packages comfortably.

Larger packages, such as antitoxin, etc., are laid in the compartments in the usual manner, but all of one kind and make of preparation are kept together. The compartments are lettered *A, B, C, D*, etc., and an alphabetical card index, showing, opposite the name of each product, the letter of the drawer in which it can be found, is now being prepared so that anyone will be able to find any biological product in stock, although it is very easy to do this at present with the alphabetical arrangement referred to above.

A novel method for keeping track of expiration dates is also in use at the Peacock Pharmacy. A five-cent Wanamaker Diary is kept on the desk near the refrigerator. On or about the first of the year the name of every package in the refrigerator is written on the page of the diary which corresponds to the expiration date of the preparation, providing, of course, that this date comes within the ensuing year. Each additional package bought during the year is entered the same way, provided its expiration date comes within the year for which the diary holds good. Of course, any preparations expiring later than this particular year will be recorded in the diary for the following year, if they are not already sold by the first of January following. Once this record is made, the man in charge has no trouble in keeping fresh stock on hand. Each day or two he will consult the diary for three or four days in advance, to see which packages will then be out-dated, and then he looks into the refrigerator to see if they have been sold, crossing their names off the list if the latter is the case, and taking out those packages which remain, preparatory to exchanging them for new stock. All told, this requires less than fifteen minutes a day, on the average, and as a result, the words "We have it, but the date expired yesterday" are strangers at Peacock's Pharmacy.

Biological business, like any other side-line in the drug store, must be handled in an efficient, business-like manner if proper returns are desired.

It is a clean, ethical and necessary line and its proper handling brings prestige as well as financial returns to the retail druggist who is willing to give it a little time and attention.

Manufacturing houses supplying biological products are very liberal with explanatory literature, follow-up letters and post cards for physicians, which advertise both the products and the store at which they may be had.

If it is true that the use of biological remedies has to some extent curtailed prescription writing, that is all the more reason why the retail druggist should show his physician friends that he is just as able to intelligently fill orders for these products as he is to fill prescriptions, and that he not only has the latest information on how to keep biological products in condition for instant demand, but that he puts this information to practical use for the benefit of the physician and his patients.

CHOLERA MIXTURE; AN IMPROVED FORMULA.*

BY OTTO RAUBENHEIMER, PHAR. D.

The sale of diarrhœa mixtures or so-called "cholera drops" has become a necessity, especially during the summer months. For this reason the National Formulary, one of our legal standards according to the Pure Food and Drugs Act and the State Laws, provides five different formulas, two of which, namely Squibb's Diarrhœa Mixture and Sun Cholera Mixture, will be retained in the 4th edition of the N. F., now in print and official from September 1, 1916.

The "Sun Mixture" is without doubt the most important, and its history is given in another paper. However, owing to its high opium content, namely 20 volume percent of tincture of opium, it cannot be sold to the public without a physician's prescription, according to the Federal as well as the State Laws.

What is the pharmacist to do under these restrictions? Various suggestions have been made, so as to sell cholera mixture to the suffering public.

1. To reduce the quantity of tincture of opium, so that one fluidounce contains *not more than 2 grains of opium or one-fourth of a grain of morphine.*

2. To replace the 20 percent of tincture of opium by such astringents as tincture of cinnamon or kino or gambir.

3. My own suggestion is to modify the formula in such a way as to contain 50 percent of paregoric. Here is my formula:

IMPROVED SUN CHOLERA MIXTURE.

Spirit of Peppermint	2 volumes
Spirit of Camphor	1 volume
Tincture of Capsicum	1 volume
Tincture of Rhubarb	1 volume
Camph. Tincture of Opium	5 volumes

Dose: 1 to 2 teaspoonfuls in a wineglass of water as required.

Why do I advocate the use of paregoric? Because from personal experience I am convinced of its beneficial use in cramps, pains and diarrhœa. Elixir Paregoricum has most certainly stood the test of time, both as a household remedy, as well as a pharmacopœial preparation, having been originated about 1700 by Dr. Le Mort, Professor Chemistry at the Univeristy of Leyden, Holland.

These "Improved Cholera Drops" contain merely a trace of opium, namely 0.2 percent, or 0.02 percent of anhydrous morphine. It seems hardly possible that the "opium habit" could be contracted from this mixture, as its taste is not any too inviting.

As another argument in favor of this preparation, I beg to state that I have sold these cholera drops for over a year with perfect satisfaction to my customers.

* Read before annual meeting of New York Pharmaceutical Association.

HISTORY AND PREPARATION OF INTRAVENOUS SOLUTIONS.*

BY M. BECKER.

Intravenous medication, as the name indicates, is a direct, exact and efficacious method of administering medicine, and is employed quite extensively in medical practice with drugs of known and proven therapeutic value, also in an experimental way on animals.

Not only is intravenous medication the most direct, but it is also well known that many patients are unable to take certain medicines when given orally, for example, salicylates, iodides, mercury and iron salts, which cause unpleasant digestive disturbances and form chemical compounds with the contents of the stomach, thereby entirely defeating the purpose for which the medicine is given. This constitutes one of the reasons why intravenous and hypodermatic forms of medication are holding such an important place in the practice of medicine to-day.

One would be led to believe, from the knowledge of the extensive use of hypodermatics, that these antedated intravenous medication. However, this is not the case, as intravenous injections of drugs were administered several centuries before medicines were given hypodermatically.

If we consider the transfusion of blood under intravenous injections, then that procedure goes back to the remote antiquity. The Egyptians are said to have practised it. The earliest method of intravenous medication dates as far back as 1492, when it was recommended for the treatment of Pope Innocent VIII. If we confine ourselves strictly to the subject of the injection of drugs, the first experiment of that character was performed in England by Christopher Wren, Professor of Astronomy at Oxford, who first tried the bold experiment of injecting drugs into the veins of animals. In 1656 he injected opium and crocus mettalorum, using dogs as his subjects of experiment. His injection apparatus consisted of a quill attached to a small bladder, and not the hypodermic syringe, as we have to-day. The opium stupefied the dogs, but did not kill them; while the crocus caused violent vomiting.

The first injection to man was given by Wren in 1657. It appears that a certain foreign ambassador at the court of St. James became interested in Wren's experiments and offered a delinquent servant of his as a subject for experiment. In 1662 J. D. Major, an English physician, and Escholtz made several successful injections on human beings.

Altogether the experiments at this first and early period of intravenous injections were discouraging in their results, and for that reason the practice fell into disrepute, and was not revived until about the end of the eighteenth century. The reason for this was that the preparations were applied indiscriminately in all kinds of cases, and, perhaps, the preparations were not compounded properly. At the same time they paved the way to our present rational intravenous therapy based on careful pathologic, pharmacologic and chemical research, and to-day the drugs used for intravenous injection are increasing rapidly.

* Read before the Denver Branch, A. Ph. A.

In preparing intravenous solutions there are certain critical points to be considered; for instance, precipitation, contamination, sterilization and compatibility with the blood stream. I am unable to go into detail in this matter, because in numerous cases each drug or chemical requires special preparation before being made compatible with the blood stream. However, there are others that need very little treatment and the solution is all that is required of it for intravenous use.

The ampoule is the preferred form of marketing and dispensing intravenous solutions because it is free from contamination, more exact and more permanent. In preparing the ampoules they are washed with a special apparatus made for this purpose, or by other means, such as boiling in distilled water and cooling quickly, whereupon water enters the ampoule and is rinsed out. This is repeated several times, and in some instances the ampoules are first prepared by washing in acid and rinsing them thoroughly before the preceding process is carried out. When this procedure is completed the ampoule is sterilized, which is usually done in a sterilizing oven at about 125°C., or in an autoclave.

The sterilized ampoules are then filled by one of several methods, namely, the vacuum, gravity or pressure, the vacuum being preferred when it can be used, or when a large number is to be filled. In the vacuum method the ampoules are put in a crystallizing dish bottom up, or put on a special plate and a crystallizing dish placed over them and both inverted; hence, the ampoule is bottom up and ready to be put in the desiccator made for the purpose. A little in excess of the calculated amount of the preparation to fill the ampoule is poured in the crystallizing dish. The crystallizing dish, containing the ampoules, is then put into the desiccator. The desiccator is closed and the air exhausted by the vacuum, and by gradually allowing it to re-enter, the atmospheric pressure forces the liquid into the ampoule. In the gravity method of filling ampoules the burette or special graduated tubes made for the purpose are found the most convenient; while in the pressure method the hypodermatic syringe cannot be surpassed.

The filled ampoule is then ready for sealing. In most cases it is done in large quantities by means of a blast, but they may also be sealed by means of a Bunsen flame. The hermetically sealed ampoules are then tested by touching or drawing over a blotter, or by boiling in colored water, and in case of leakage after the water has cooled the colored solution will be found inside of the ampoule. The sealed ampoule is now ready for sterilization, the heat, of course, depending upon the nature of the compound, and often requires a considerable amount of research work.

Because of the favorable view the medical profession has taken on intravenous medication, and because of the constant increasing demand from all parts of the country for all kinds of preparations, it is necessary that pharmacists should be prepared for such dispensing. The most important point to be considered is, to see that the preparation is free from contamination and precipitation, is properly sterilized, and is compatible with the blood stream. Certain drugs require special preparation before making them compatible with the blood stream, and unless the pharmacist has the time to devote to experimental work and to testing the finished product, both chemically and physiologically, it is safer not to attempt to prepare intravenous solutions. It has been our experience that seemingly harmless chemicals or drugs, as well as the more potent ones, have given severe reaction or anaphylaxis, and in some instances have proven fatal to animals.

Laboratory Intravenous Products Co., Denver.

UTILIZING SURPLUS STOCK IN THE MANUFACTURE OF HIGH PRICED CHEMICALS.*

BY IVOR GRIFFITH.

Many druggists, during these days of aëroplane prices, are offered opportunities to use their knowledge of chemical reaction for money saving purposes. Strange to say, however, not many of them, for one reason or another, seem to possess enough self-confidence to tackle these problems. In a sense this lack of confidence is justified when we consider that the pharmacist, much to the detriment of his professional ethics, has become accustomed to having most of his thinking done by someone else.

Sometimes we sigh for the good old days when the corner druggist made his own blue ointment, his own bromides and his own elixirs and made them with care and thoroughness, qualities that we often feel are not prominent enough in the make-up of the druggist of to-day. Not that the modern pharmacist lacks these good points, but simply that he does not accept opportunities to display them as he should.

A few weeks ago a country-town druggist complained, to the writer, of his "terrible misfortune" in having on hand about ten pounds of salicylic acid; formerly he had sold this preservative to the "home canning" folks who now use boric acid instead. My friend explained that if it had been sodium salicylate it would not have mattered much, because his stock of that was practically exhausted and he would very soon have to buy more. When I suggested that he manufacture the latter out of his stock of salicylic acid he laughingly retorted, that he would not care to take sodium salicylate of his own manufacture or dispense any for his good friends. While we cannot call this man a good representative of our calling, we must admit the presence (sad to relate) of many of his kind among us.

To bring matters closer home, how many here have bought at a ridiculously high price a chemical that could have been prepared from material on the shelf that had been bought at pre-war prices, simply by using a little ingenuity and care in its manufacture? To return, however, to our subject, we have endeavored in the following matter to assemble in a condensed, yet practicable, form as many processes and reactions as might be of use to those druggists who have enough self-confidence and are anxious to save money as well as gain experience by carrying out some of these processes in their own laboratories:

Sodium Salicylate.—Mix 100 grammes of salicylic acid with sufficient distilled water to form a paste, and then add 104 grammes of pure crystallized sodium carbonate or 45.18 grammes of monohydrated sodium carbonate, in a glass or porcelain dish of large capacity. When the reaction is over, heat gently to expel all of the carbon dioxide. Strain through well moistened muslin. Test the solution with litmus paper and, if alkaline, add sufficient salicylic acid to make the solution slightly acid. Evaporate carefully, avoiding contact with metal. The dried salicylate will be white, if properly made, and colored grey if carelessly made. The latter can be corrected by redissolving in distilled water, adding a slight excess of salicylic acid and again carefully evaporating to dryness. To prepare a solution of sodium salicylate from salicylic acid and sodium bicarbonate,

* Read before Pennsylvania Pharmaceutical Association, June 22, 1916.

the following proportions of the constituents are employed: To make 10 grammes of sodium salicylate use 8.175 grammes of the acid and 5 grammes of sodium bicarbonate. This latter method is convenient for the manufacture of a stock solution.

Ammonium Salicylate.—Dissolve 89.0 grammes of salicylic acid in 39.28 grammes of 28° ammonia water or 109.98 grammes of 10° ammonia water, in a glass container. Evaporate the solution to a concentrated form and test with litmus. If alkaline, add enough acid to render it distinctly acid and crystallize in a muslin-covered vessel.

Strontium Salicylate.—Dissolve 10 grammes of salicylic acid in 100 mils of boiling distilled water in a glass or porcelain container. Add 5.3 grammes of pure strontium carbonate. Filter and add enough acid to cause a slight excess. Evaporate and crystallize.

Lithium Salicylate.—To 25 mils of hot water in a glass or porcelain dish add 10.9 grammes of salicylic acid and 3.0 grammes of lithium carbonate. Heat till effervescence ceases. Filter, add enough salicylic acid to render slightly acid and evaporate to dryness.

Sodium Benzoate.—Mix 84.7 grammes of benzoic acid with 43.29 grammes of monohydrated or 99.59 grammes of crystalline sodium carbonate in 200 mils of distilled water in a porcelain evaporating dish. Heat gently and when effervescence has ceased filter, render acid by the addition of a little more salicylic acid when necessary, and evaporate to dryness. These quantities produce about 140 grammes of the salt.

Ammonium Benzoate.—Treat 87.75 grammes of benzoic acid with 43.8 grammes of 28° or 122.63 grammes of 10° ammonia water in a similar way to make 138.06 grammes of this salt.

Several weeks ago, the pharmacist at a Philadelphia hospital found some twenty odd ounces of pure bromine, that had been used in urea estimation at the pathological laboratory, in a test now replaced by Dunning's Urease Reagent. The bromine was therefore practically useless to them until bromides commenced to skyward, when the pharmacist conceived of a plan for its use in making potassium or sodium bromide after the method outlined in the sixth revision of the U.S.P., which is as follows: Take of bromine 62.2 grammes; pure iron filings, or card teeth, 31.1 grammes; crystal potassium carbonate, 66.10 grammes; distilled water, 2 liters. Add the iron and afterwards the bromine to 750 mils of distilled water, stirring the mixture frequently, with a glass rod, during half an hour. A shallow vessel containing weak ammonia water, standing beside the bromine container, will absorb the suffocating odor of the bromine. At the end of the half hour apply a gentle heat, and when the liquid assumes a greenish color add gradually the potassium carbonate, previously dissolved in 750 mils of distilled water, until it ceases to produce a precipitate. Continue the heat for a half hour and filter. Wash the precipitate with 500 mils of boiling distilled water, and again filter. Mix the filtered liquids and evaporate. Set aside for crystals to form and discard the mother liquor.

Sodium bromide can be prepared in the same manner, using, however, 57.44 grammes of pure crystallized sodium carbonate or 24.97 grammes of monohydrated sodium carbonate instead of the equivalent amount of potassium carbonate.

PHARMACY AND THE ARMY.*

BY ARTHUR H. JENKIN.

The demand for commissions in the British army by pharmacists appears on the face of it to be reasonable, and the ambition a perfectly legitimate one; it is only when we examine the matter from the army man's point of view that both the reasonableness of the demand and of the ambition become more than doubtful. It is an axiom that the dispensing of medicines should be undertaken by men with the necessary qualifications, and, paradoxical as it may seem, most of the army dispensing is so controlled, being done by the manufacturers of pills, tablets, and readily-measured compound galenicals before the army compounder (really the M.O.'s orderly) ever sees them; although in certain hospitals and depots there may be a doubtful reliance occasionally placed upon a particularly smart man of this type, where a pharmacist should be employed, generally speaking there is no room in any one regiment for a pharmacist-officer as such. It is only by making these facts clear that pharmacists can proceed if they are not to delude themselves with the idea of their importance to the Army Council. For dispensing only there is no room for them except in very special cases.

If, however, we turn to their personal as well as pharmaceutical qualifications, we can make out a case not nearly so easily to be refuted. As a man used to purchasing and taking charge of a very various stock of most diverse bulk, the pharmacist should, especially with training in sanitation, ambulance, bacteriology, X-ray work, etc., make for each regiment a most efficient quartermaster or his commissioned assistant; the medical stores, apparatus, and dispensing becoming his particular charge under the direction of the M.O.; general stores, etc., under the direction of his superior quartermaster, and himself the responsible officer (as the quartermaster at present is) for the general arrangement of camps or billets, the food and water supply and the sanitary arrangements, in addition to the supervision of the distribution of medicaments and the possible introduction of a more varied dispensing of medicines. Although readily capable of assimilating the theoretical knowledge, it has in the past been almost impossible for the pharmacist to acquire the necessary practical experience which would alone justify his demand for recognition. With the establishment of special training centers, the institution of classes for drill and technical subjects, together with the field experience to be gained with the regiment to which he is attached, the pharmacist's claim will be greatly strengthened for further training by a department of the R.A.M.C., which could, by a suitable subdivision, be made available for the purpose; both freeing medical men for more legitimate advisory and diagnostic work, and providing the Army with a service which nearly all Continental armies are glad to make use of.

There can be no doubt in the minds of thoughtful men that Britain will never go back to the ante-war Army conditions. The mere fact of the increased stamina of the young recruits of the first days of the war, as compared with that of their companions who did not join so soon, is quite sufficient to prove the necessity of the universal training of the youth of the nation on similar lines in

* *Pharmaceutical Journal and Pharmacist*, July 8, 1916.

the future, even if it is not necessary for military purposes; and in the new condition pharmacy must take its place in the forefront, instead of waiting on the offer of a back seat.

On the suggestion of eminent authorities connected with the Army Medical Service, the Pharmacists' Volunteer Training Corps, at first independently, afterwards as a unit of the Central London Regiment (soon to have its sphere of action still further widened), has worked tentatively in the various directions above indicated, and has attracted considerable attention from responsible officials connected with the War Office. As its members are precluded by their business engagements from joining the regular forces, only a few of those who have passed through its earlier courses of training are engaged in active service, but the experience gained will be a valuable asset when it comes to training the young man of the future, making a fine stepping-off place for his work as a commissioned pharmacist.

A warning note must be struck when we speak of ambulance work, sanitation, bacteriology, X-ray work, etc. It should never be suggested that a pharmacist would become merely a stretcher bearer or first-aider, although he should have full knowledge of the requirements in these directions. Nor is it essential that he should be a practical plumber, an analytical chemist or a fully-fledged meat or sanitary inspector. Yet less would it be expected of him to carry his work in bacteriology beyond the micro-biological stage, or his X-ray work beyond facility in handling the apparatus for taking photographs or administering indicated doses from the medical officers' directions. It would be no part of his business to offer any opinion on a case because he was able to recognize the bacillus of tuberculosis, or to make any statement as to a particular fracture, because he happened to have X-rayed a similar one, any more than it would be to attempt to correct the physiological conditions leading up to an attack of neuralgia or to supply medicaments to an undiagnosed case, on the strength of a patient's assertion as to his particular complaint. In short, his sphere in these services would be preparatory as the assistant of the medical man, so that from his work a diagnosis, which he could not undertake, might be made by those trained for the purpose. Diagnosis and the subsequent prescribing are, and must remain, outside his province.

Rules of professional conduct, embracing these, must be rigidly adhered to by a commissioned pharmacist if he would gain and retain the respect and good will of the Army Council and its medical advisers.

On some such lines as these it appears possible that the pharmaceutical demand for commissioned rank can be met, and would possibly be welcomed. The time is ripe for immediate action. The "wait until after the war" crank will doubtless raise his voice, but we are at present in a little backwater of time. Our active young men are at the front. They will not wish to come back to old conditions. Our preparations must be well forward, our plan of campaign elaborated, the spade work of a secure foundation for our superstructure put in, *now, by us,* if we are to prove our worth, not only to the Government, but to the nation at large.

THE WAR OF THE METRIC SYSTEM.*

BY A. L. BENEDICT, A.M., M.D., BUFFALO.

Although an advocate and user of the metric system, so far as practicable in this country, for nearly thirty years, it amused me to see the present European war thus characterized by an amateur writer for a newspaper. After seeing the same view expressed in one of our critical weekly reviews, the suggestion did not appear so ridiculous.

Offhand, the fact that practically all of the combatant nations use the metric system almost exclusively, with the sole exception of Great Britain, whose entrance into the war is historically an after event, would seem to dispose of the question. But it must be recognized, first, that the Germans have persistently regarded the war as primarily against England, and while present history taken literally shows this view to be an anachronism, it is only fair for a neutral country to await the subsequent submission of evidence before making a final decision. It may be that the German claim can be shown to be not only persistent but consistent. At any rate, getting behind the immediate cause of precipitation of conflict, which was too far fetched to be an explanation and which has practically been forgotten, there is no question that the essential cause of the state of tension in Europe was the growing power of Germany, economically rather than directly military, up to the point at which the restraint of England became an appreciable factor in limiting its further growth.

Taking this deeper view of the war, its designation as one of the metric system is quite understandable, and in no such symbolic sense as the War of the Roses, or the cruder and very recent designation of the present war as one of the sausage against the beef steak. In the literal and narrow sense, the adoption of the metric system by Germany was one of the most important minor reasons for the phenomenal industrial and commercial growth whose regrettable result has been the present war, and we need not discuss the question, at present quite academic, whether this result was necessary. In a somewhat figurative and broader sense, the designation, war of the metric system, is still more applicable. It implies prompt and universal adoption, at the cost of temporary inconvenience and contrary to habit, of something that is ultimately desirable and economic. By itself, the adoption of the metric system by Germany would not have been important—no more important, for example, than the change from Gothic print and script to Roman a few years ago, nor the omission of a few silent letters to simplify the spelling, already close to phonetic perfection compared with the almost purely arbitrary spelling of English. But as one of a considerable number of changes, adopted universally in a comparatively brief space of time historically and involving social, educational, economic, industrial, political, military, naval, and other factors in the welfare of a people, it stands out as a type of German achievement rather than as belonging to other countries, even perhaps including that in which it originated. In this sense, it typifies efficiency and far-sightedness. Grant that not every one of the changes introduced, at the expense of immediate convenience and with a view to ultimate improvement, has been successful. Grant even that this particular change has been unwise, as most of the readers of this article will, if they think as they practise, and it is still evident that the same spirit of seeking

* Reprinted from *New York Medical Journal*, April 29, 1916, pp. 824–826.

efficiency in details, broadly applied, will in the aggregate result in superior rate of advancement, unless we assume a general faculty of making unwise decisions.

The metric system typifies German efficiency, civil and military, in quite a different way—convertibility and correlation. This is true in both the literal and the figurative sense. Everything that the army requires that is ponderable, a hypodermic medicine, a loaf of bread, a bullet, a gun; anything that it secures from ordinary commercial supplies without special preparation in advance, is weighed in some decimal multiple or fraction of a gramme. Everything that is measured along a line, the soldier's height, his step, his roads, his blanket, the calibre of weapons, the distance that he travels, and everything that he encounters that is not directly designed for military use but which he may need, is similarly measured by the meter. The sole exception, and this may no longer be true, is that the importation of railroad tracks and rolling stock from England left this form of transportation with the impress of the old miscellaneous units of measurement. The obvious exception of other imports, mostly in bulk, need not be considered as a practical handicap.

Further than this, every branch of the metric system comes together, somewhere, with the others; for example, the Cc. and the gramme, the solid and the liquid bulk ton. Even the mark, the unit of money value, is practically a six gramme weight. It is the same spirit of correlation that has made the immediate adaptation of the railroads and postal service to military requirements possible, that has put the travelling soup wagon, the automobile truck, and a host of other things immediately in the category of military auxiliaries.

As an illustration of the value of the correlative spirit of the metric system, the negative method is the more striking. Ask yourself, for instance, how many pounds there are in a bushel of potatoes, or how much a bushel of water would weigh, or how many cubic inches there are in a gallon. There is an old rhyme to the effect that a pint is a pound. Probably there is some liquid that at some temperature and pressure would weigh a pound to the pint, but there is no accurate and simple relation among any of the necessarily diverse methods of mensuration by weight, length, area, and volume, except in the metric system.

Another negative illustration of the value of the metric system may be put in the terms of the logical development of land. It is first mapped out in degrees and minutes, then surveyed by the square mile, roads are run through by the rod, distances are measured by chains and links. The land is farmed by the acre. It becomes valuable for building purposes and is sold by the foot, linear frontage or square, according to local custom, depending largely on value. The building is erected by feet and inches, some of the metal work being in feet and tenths. Feet of lumber, neither linear nor cubic, come into the estimate. The house is ready for occupancy and is supplied with carpets and curtains by yards of varying width, for carpets even the grade and price deciding whether we deal with three-quarter or one-third fractions if we think in yards or improper fractions, or units if we think in feet. Contrast this with the metric system where, from degree of latitude —obviously the degree of longitude varies—in the original map down to the minutest particular of house furnishing, we are dealing with even multiples of the same unit.

I do not wish to discuss military preparedness further than to say that, so far as the medical profession is concerned, a very important item would be familiarity with the metric system, which is at least theoretically standard for the existing government services. Without such familiarity, much confusion would result in the military medical service if war came. But military preparedness includes a

multitude of items that have nothing directly to do with killing. Nearly every fundamental science which applies to development in peace and equally to war has for some years worked in metric units. This is true of medicine, of physiology, and chemistry, and of a large number of special scientific branches which can scarcely be termed independent sciences, microscopy, pharmacology, bacteriology, serology, etc. A change of units in passing from the scientific to the practical has its obvious disadvantages. The same statements may be made, with some qualifications, as to the relation of the scientific and the practical in nearly every art and industry of peace. Both in its own field and as an example and incentive to other professions and trades, our profession can perform an important service by furthering the general use of the metric system. This service would be of incalculable value from the peace standpoint; it would do much to avert catastrophe if we are to have war. Let us not forget that this service would be something more than facilitating measurements by substituting the advantages of decimal computations and correlated units. It would be a training in coöperative foresight and initiative to secure efficiency.

BRITISH CHEMICAL SOCIETY.

A meeting of the above was held on Thursday, February 3, at 8 P.M., at Burlington House, Piccadilly, W., Dr. Alexander Scott, F.R.S., being in the chair, when Professor W. H. Bragg, M.A., F.R.S., delivered what was subsequently described as a unique lecture, and one of the most remarkable ever delivered in Great Britain. Professor Bragg, together with his son, was awarded the Nobel Prize of last year for the work of which the present lecture was a record. It was entitled "The Recent Work on X-rays and Crystals and Its Bearing on Chemistry," and dealt with a new conception of the atomic and molecular structure of crystalline substances and a method by which the subject might be elucidated.

Professor Bragg said that the subject was still a novel one. It had started from very small beginnings—from the discovery of Dr. Von Lowe that crystalline structure acted as a diffraction grating for X-rays, and that it was possible to throw on a screen a pattern of the structure of a crystal by this means, which gave some idea of the molecular constitution of the substance. By a happy chance, due to the work of the lecturer's son, Lowe's work was simplified, and, what is much more important, made quantitative. The principle upon which the work subsequently described is founded depends upon a simple phenomenon of light. In the ordinary soap film, for instance, if a ray of light is incident upon it at an angle, then one sees a play of rainbow colors over the surface. This is due to the fact that there is reflection of light at both upper and under surfaces of the film.

COPIES OF PRESCRIPTIONS.*

BY OTTO RAUBENHEIMER, PHAR.D.

It is an every-day occurrence in a pharmacy that a copy of a prescription is asked for. Frequently patients move away from the neighborhood or care to make a change for other reasons. When the patient calls for a copy, I find that the most satisfactory method is to give him same, without any further arguments or comments. Oftentimes the physician asks the patient to get such a copy for his own information, quite especially when a change in doctors has been made.

That the patient is rightly entitled to a copy of his prescription, that is of an ordinary *but not of a narcotic prescription,* has been decided by the courts on several occasions. Why not? After all the patient has paid the physician for his advice and the resulting prescription. He can have this prescription compounded at any pharmacy and demand that the original, his property, should be returned to him. Of late years, physicians frequently specify that this prescription is not to be repeated and also that no copy is to be given. If this is the case then the pharmacist should honor the wish of the physician. Consequently, it is "up" to the medical profession to prevent the custom, if not the abuse, of the refilling and the copying of prescriptions.

For years I, and no doubt other pharmacists, have adopted a rule to make a memorandum on prescriptions: "Copy given on such a date." I have instructed my clerks and apprentices to do this and I have always taught my students in the College to practise this simple system. The advantages of this precaution are obvious, namely, a permanent record and the prevention of giving copies indefinitely.

During the past few years I have paid particular attention to copies of prescriptions, which were received at my pharmacy as well as other drug stores. To my surprise, to my great surprise, I have learned, not from hearing but from actual observance, that some pharmacists are in the habit, in the bad habit, of *writing copies of prescriptions on blank pieces of paper, which do not bear their name or address.*

Such practice is abominable and detestable; it is a discredit, in fact, a disgrace to pharmacy. And why such an evasion, such a shirking of responsibility? Simply because the druggist, the timid, the over-timid druggist is afraid of being *underpriced by his brother* pharmacist. Truly a brotherly love indeed!

But this is not all! Copies are given in such an illegible handwriting, that they are difficult to decipher and may be the cause of misinterpretation and even mistakes which might be fatal. It is obvious that such cryptographs are given intentionally, so as to hinder another pharmacist from filling the prescription. I even know of a case in my own experience when I received a copy of a prescription without name and address in which merely the ingredients were given, *but not the quantities.* Upon telephoning the druggist, after obtaining his address from the patient, I received the great satisfaction that he blamed his clerk for this negligence or still better, this trick.

It is this shifting of responsibility, this shirking of accountability and the consequent irresponsibility which at the present day is one of the great dangers, if not

* Read at the meeting of the New York State Pharmaceutical Association, Richfield Springs, June, 1916.

the curse in pharmacy. It is high time that pharmacists wake up to this fact and better their conditions and better themselves.

Now as to the lesson in my paper. It has the following object. Let the New York State Pharmaceutical Association be the father of a bill or an amendment to the Pharmacy Law providing the following:

1. Copies of prescriptions must be true copies.
2. Must be written distinctly.
3. Must bear the name and address of the pharmacy or the pharmacist who compounded the prescription and who gave the copy.

Such provisions are fair and square and are needed badly. They must come, the sooner the better, for the protection of the public health and safety.

Let the Empire State lead the way, and no doubt other states will follow!

NITROGEN: ITS VIRTUES AND ITS VICES.

It is strange to think that we live by breathing an atmosphere containing 80 percent of nitrogen which in certain combinations is dealing out death on an appalling scale. There are practically no useful explosives employed in which the action of nitrogen is not concerned. Without its aid the great ships at sea could not be sunk, or innocent victims on land killed, or property destroyed by the aeroplane and dirigible, while it serves to mow down whole columns of men in the field, for rifles, howitzers, machine-guns, and grenades are all dependent upon, and made terribly deadly by, the offices of nitrogen. We every day pass on to our lungs something like 450 gallons of nitrogen per 24 hours, which would be enough to make 30 pounds of tri-nitro-toluol, or 40 pounds of gun-cotton. In our early training in the elements of chemistry we were wont to regard nitrogen as a singularly uninteresting gas on account of its negative behavior. It did not burn like hydrogen, it did not support combustion like oxygen, and, in short, its presence was generally assumed because of its inactivity and because it did not directly respond to any test. And yet this element is the greatest of all as a munition power; it is hardly an exaggeration to say that applied nitrogen is going to be a factor in deciding the issue of the war. It is remarkable, also, that this element forms the central figure in the protein group or tissue-repairing material of our foods. To say that without protein we die, practically means that without nitrogen we die. The gas without positive tests is as necessary in one form for our support as in other forms it is ready to destroy us. Nitrogen's power depends in the first place on the fact that it carries in oxygen to compounds which are thus rendered explosive, turning all the elements into a huge volume of gas, itself being set free. The very inertness of nitrogen, or its objection to affinity, means that on the least provocation it will easily release its partner oxygen, handing this over to the combuston of other elements present, with the formation of volumes of gases, the nitrogen returning to what is apparently its congenial condition, the free state. As a fertilizer in the soil nitrogen acts as a stimulant and supplies the necessary nitrogen to the plant. In other words, it is a plant food. Thus the remarkable thing about nitrogen above all other elements is its power to destroy life or to sustain it according to the associates with which it is in company. With certain accomplices it forms death-dealing explosives, with others it becomes a nutritive material. It is the essentially romantic element, devil or god, according to its associations.—Abstracted from *The Lancet*.

WHY APPLICANTS FAIL TO PASS THE STATE BOARD EXAMINATIONS.*

BY GEORGE M. BERINGER, JR., P. D.[1]

Why do men find it difficult to pass examination of the State Board of Pharmacy? It seems that almost every one gives a different reason. However, let us see what kind of answers the candidates give in the examinations, and we shall then be in a better position to judge the real reason.

The following answers were all given in examinations in Materia Medica before the New Jersey State Board of Pharmacy during the last year:

A Rubefacient "acts on worms."

Cannabis Indica "comes from Canada."

"*E-a-r-t-a-t-e-s* the nose" is the way one candidate describes the action of a drug.

Musk comes from the "Perpetual Follicles."

Musk "is a insect."

Musk "is Sumbul."

The official title of Alum is "Alumni."

Refrigerant was defined as "preventing from getting rancid." Example, "Benzoin would be a refrigerant in Benzoinated Lard."

"Citric Acid is mined."

"The *seed* of the plant is used in making Gossypium Purificatum."

"Supernal Glands" is the way one candidate writes Suprarenal Glands.

"Troches are intended as receptacles for medicine."

"The physical difference between Paraffin and Spermaceti is that Paraffin is purer."

The official title of Diphtheria Antitoxin is "Mamalia."

"A chemical heart tonic is stomach pump and emetic."

"Digestive ferments are those substances that give off gas in the stomach, as Castor Oil."

"Two classes of plant principles used in medicine are cotyledons and dicotyledons: Example bark—pith and wood."

"The chief constituent of Oil of Gaultheria is resin, starch and sugar."

"An Anthelmintic is an agent that recovers from consciousness."

The following is the wonderful effort of one candidate: "Gum Benzoin contains Myrosin. Becomes active when heated, then it can be used as a glue."

"Rhus Glabra grows in *South America* and *tropical countries.*"

"Hydrastis grows in *South America* and *tropical countries.*"

"Acacia grows in the *United States.*"

These last three were not given by one candidate only, but by many in the same examination.

"A Cholagogue is an agent used in cases of kidney disease to act as a filtering medium when the kidneys do not."

One candidate gives the correct definition, but gives as an example, Resin Cerate.

"Diaphoretic, a drug capable of retarding *flem* from *bronical* tubes; example—Matricaria"

The official name of nutmeg is "Mysteria."

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* Read before the New Jersey Pharmaceutical Association, June 22, 1916.

[1] Member Board of Pharmacy, State of New Jersey.

Another says this drug is "odorless and tasteless."

"Honey—the official name is Mail—the source is bee combs."

"Honey—the official name is Ovis Orris deposited by the bee."

"Honey is Mel Scrofula."

"The scientific name of the source of honey is *Glucose.*"

"Digitalis should be kept in tight sealed bottles because it picks up moisture from the air and it might deliquesce and become hardened."

"Digitalis should be made fresh often as the older it gets the stronger it is."

"Cod Liver Oil is the oil taken from the bladder of the Cod-fish."

" Cod Liver Oil is obtained from the bladder of the fish."

"The official title of Cod Liver Oil is Oleum Origanum."

" Couch Grass has a *vacum* inside."

"Terebinthina Canadensis is a rhizome and root; the habitat is Europe."

"Spanish fly is *Diama.*"

"Infusion of Wild Cherry should be made with *hot* water so as to liberate all traces of *Carbon Dioxide* and to prevent the liberation of HCn."

Another candidate guesses, "it should be made with cold water to prevent from decolorizing."

"A Febrifuge destroys worms."

"A Febrifuge is a substance which chases away."

"An Antiparasitic checks up perspiration."

"An Antiparasitic prevents paralysis."

"An Antiparasitic is a drug that will reduce fever."

"An Antiparasitic is a drug relieving or preventing spasms of fits."

"The source of Cantharides is *Mosche Cantharidu.*"

"A vesicant is a mild cathartic as Compound Licorice Powder."

"A vesicant is a drug that will serve as a vehicle."

"A vesicant is a drug that will enlarge a vessel to increase blood pressure, as Struchnine."

"Tragacanth is Dandelion."

"Senna is a *folio.*"

"The source of Wax is *Abies* Melliferous."

"Wax is Cetaceum obtained from Spermaceti gotten from *the bone of the whale.*"

A wonderful display of knowledge on the part of one candidate follows:

"Amygdalin in the presence of Sulphuric Acid—Alcohol and Ether produces an aldehyde, acetone and H C N"; and he gave an equation, balanced on paper, to prove it.

Here is a candidate that surely does not need his own prescription. In answer to a question concerning the proper base for an Ichthyol Ointment he answers: "I would recommend a 20 percent ointment for all ordinary purposes where reducing *information* is desired."

Where the candidate got the following is a mystery: "Two classes of plant principles are *Mamalia and Insecta.* A substance belonging to Mamalia is *Lard* from the *Sheep* and the *botanical* name is Ovis Aries."

"Acacia is used in Brown Mixture to keep the mixture in *suspense.*"

Here is a candidate who has a vivid impression:

"Asafetida—odor like a skunk, taste awful."

"Aqua Rosæ is obtained from the *pedestil* of the Rose—chiefly."

"Tinctura Ferri Chloridi—taste very dry."

" Flour of Sulphur is *groung* roll sulphur," is about all one candidate knew about the description of sulphur.

Another says: "Sulphur has k-n-o-w odor."

Prunum—"dose 25 of them—good help for the bowels."

Another describes prunes as "a liquid, dark red in color."

Still another gives a description and ends with, "as one might see in an Acme Tea Store."

The question was, "*a.* Define briefly each of the underscored words in the following definition:

The *concrete* milky *exudation* obtained by *incising* the unripe *capsules* of Papaver Somniferum.

"*b.* Why is unripe specified?"

A few of the answers are represented in the following:

"Concrete is a substance of very binding nature."

"Concrete is the *foundation* of the capsule."

"Exudation is the juice obtained from it by extracting it."

The man who gave the following is evidently a *Bible* student who became confused:

"Exudate means to be taken out of bondage."

"A capsule is a dehiscent fruit that splits and permits the seeds to come out *unsolicited.*"

"A capsule is a substance having a *vacum* which is capable of being filled by some other substance."

"Incising means exciting."

"Unripe is specified because it is of a *better nature* and yields more alkaloids."

"Cinchona is used as an *incipient* in pills."

"Two ferments of animal origin are Adeps Lanum and Adeps Lanum Hydrosus. Adeps Lanum is lard and is obtained from the fat of a hog."

"Uva Ursi is the bark of *Conden-drundum Tomentosi.*"

"Serum is Servum Antidiphtheritica obtained from the coagulated blood of a horse by separating the servum immerzed by the inoculation of Diphtheria Toxin."

"Rosa is a bulb with fleshy scales."

"Concrete saccharine exudation means the inside secretions of the *stomachic.*"

"Musk is obtained from the dried female insect."

"Moschus is spanish flies."

"Tri-iodo-methane is Denatured Alcohol."

"Tri-iodo-methane is Sulphonethylmethanum."

"The two varieties of Serpentaria official are Cinnamon and Sanguinaria."

"Bees belong to the family Ruminantia."

"Galla is from the *blatter* of Bos Taurus."

"Mel is the excreted juice of the beehive."

"Honey is Fel Bovis."

"Cantharides is found on *trees* of Cantharis vessicatoria."

"Cochineal is the *female part of the insect.*"

"Pistillate is when the *bark* of the plant contains pistils."

"Cera Alba is deposited by the *white bee.*"

"Aloes occurs in the form of a *limpid mass.*"

"Cerii Oxalas is from the intestinal juices of the ox (Bos Taurus) and the sheep (Ovis Aries)."

"Cerium Oxalate is a neutral principle from Goa Powder."

"Oxgall is a substance deposited in Quercus infectoria due to a puncture and ova of Cynips Tinctoria."

"Petrolatum makes it a softer *constituency.*"

"Oxgall is from the element Cerium by interaction."

"Fel Bovis is from the active principle of the cow or the ox."
"Acetphenetidinum is a white, *crystalline,* amorphous powder."
"Punica Granatum is Pumice Stone."
"A compound of Chlorine and Calcium Hydroxide is Lime Water."
"Some drugs are easier to *commute* before they are dried."
"The chief constituent of Aloes is *trunk branches.*"
"Chloroform and Ether are both liquids having a choking sensation."
"Thymol Iodide has a *strong viscid odor.*"
"Cocaine, in solution, is colorless with *toxicating taste.*"
"Aspidium contains *Cornutine,* Filicin, *Aspidospermine* and Filicic Acid."
"Opium is obtained from Coco Beans."
"Opium is obtained from Papavia from incisions of *bark* and *trunk.*"
"The Poppy is spliced and Opium removed a mass."
"Opium comes from the *seed* of *Popa* heads."
"Rhamnus Purshiana should be kept one year to make sure that the *Amygdalin* is not reacted."
"The concrete milk juice of Lactuea Virosa is the milk of a cow."
"The prepared milk juice of several species of Hevea is *Saccharum Lactis.*"

The following covered a full sheet of legal cap paper and was given by the candidate in answer to a question as to the proper base to be recommended to a physician for use in Ichthyol Ointment under certain conditions:

"The physician should know these things himself and he should not ask the Pharmacist. He went to college and he ought to know. But however I would advise him to use for a base Lanoline Hydrosis and Petrolatum because Lanoline Hydrosis contains water and that would be the maximum absorption according to my experience being in the drug business for over 11 years and I have compounded some Prescriptions and some Preparations.

M —— D —— (Name of candidate).

"Not a registered Pharmacist in any state but I hope to God I get registered in New Jersey as I am a married man with 2 children.

"This is the 2nd time I am taking the J. B. and I studied very hard."

No doubt the ludicrous side of these will appeal to you first. But, as the seriousness of it presents itself, you will find it hard to believe the answers *bona fide.*

Very many of those taking the examinations are graduates of a college of pharmacy or have had some college training. Yet, nearly 70 percent of the candidates fail, despite the fact that the examiners endeavor to make their examinations fair and of a practical character. The more I look into the matter, the more I am convinced that the system and the character of the instruction given in the college is largely to blame for these failures. Most of the answers show a tendency to memorize a miscellaneous collection of more or less unrelated facts. Candidates come to examiners time after time, saying they have taken this or that course, calculated to enable them to pass the State examinations, and want to know what text-books they shall study to be able to pass.

Many college professors seem content with "parrot" teaching and "parrot" learning from the text-books. Why is this so? In many cases the professors are selected, not with a view of their ability to teach, but because they are more or less successful in some work related to pharmacy or because they are willing to do the work cheaply for the sake of the prestige pertaining thereto.

How many teachers in our colleges of pharmacy have studied the rudiments of psychology, or possess even the rough psychology that enables many men to

rightly judge the mental processes of their associates. How many of these teachers have had any training or even done reading in pedagogics? I doubt if one or two in a hundred could answer, yes.

The result is, that the average teacher loses sight of the fact that the students under him are only children of a larger growth, mentally as well as physically; that in them, to a certain extent, there still exists the natural inquisitiveness of the child, which makes him acquire knowledge so readily when guided in the proper manner.

The student of to-day has, in his early school training, a much better and broader foundation upon which to build his later technical training than had his predecessors. It is the duty of the technical instructor to establish points of contact with this earlier knowledge and upon it, with the aid of the student's natural inclinations, build a solid structure of knowledge, or rather, assist the *student* to build such a structure.

He cannot do this by "cramming" *dead* facts into his students. He must, rather, stimulate them by such a *live* presentation of his subject that the student will acquire the facts for themselves in the manner best suited to their individual mentality.

If this is done we shall have candidates who can *reason* answers for themselves, and can explain their text-book definitions when they use them. In other words, their knowledge will have become part of them, to be used as a means for further advancement, to what heights, who can tell?

MENTAL BLINDNESS.

Everybody values his eyesight as one of his most precious possessions. Loss of vision is rightly considered to be among the direst of afflictions.

But not everybody appreciates that there is such a thing as mental blindness as well as physical blindness; and that, to be really successful in life, it is as important to see facts clearly as it is to see objects clearly.

Many people, for that matter, unconsciously allow their mental vision to be clouded, perhaps almost destroyed, by cataracts of prejudice. They see facts darkly, because they refuse to think in a logical, unprejudiced manner.

Such people somewhat resemble the unfortunate man who had to be sent to a hospital for the insane because he insisted that he was dead. Being dead, he argued it was useless for him to take food. Accordingly, he was in a fair way to make himself dead in reality.

His relatives could not persuade him to eat, and the hospital doctors were equally unsuccessful. Finally, in a desperate effort to convince him that he was not dead, one of the doctors asked him:

"Can dead men bleed?"

"No," replied the insane man.

"Very well," said the doctor. "Now, look at this."

He took hold of the man's arm and cut it slightly with a sharp instrument, causing the blood to flow.

"There," he said, "you see you are bleeding. Consequently you cannot be dead."

"Ah, but I am dead. You have only proved that, after all, dead men can bleed."

Decidedly we must see facts as well as objects clearly. It is not enough to take pains to preserve our physical vision. Our mental vision must be safeguarded likewise.—H. Addington Bruce.

PHARMACEUTICAL FORMULAS

PROPOSED FOR A. PH. A. RECIPE BOOK

Thus far a collection of 114 Pharmaceutical Formulas has been compiled and published in THE JOURNAL, Vol. I, pp. 169, 366, 505, 637, 760 and 1307 (Feb. to Nov. 1912). Beginning with the March 1916 number these Formulas will be continued in monthly instalments by the Committee, and *all* members of the American Pharmaceutical Association are earnestly requested to render assistance by sending suitable formulas and criticisms to the Chairman,

OTTO RAUBENHEIMER, Brooklyn, N. Y.

Contributed by the Chairman:

No. 249.

IRON CEMENT.

When powdered iron is mixed with an oxidizing agent, f. i. manganese dioxide, or an eletro-negative substance, such as sulphur, in a good conducting solution, like sal ammoniac, galvanic action is very rapidly produced. Ammonia is given off and the iron swells, forming iron oxide, and cements the mass together.

Iron Filings	40 parts
Manganese Dioxide or Sublimed Sulphur	10 parts
Sal Ammoniac	1 part
Portland Cement	20 to 40 parts

Water, to form a paste.

Prof. Sadtler prefers manganese dioxide to sulphur as a negative element. The free carbon in the powdered cast iron will act as the negative pole, but manganese causes quicker action.

Portland cement acts as a diluent, otherwise the cement will expand too much and will bulge out from the hole or crevice in the iron.

CRUCIBLE CEMENTS.

No. 250.

Clay	2 parts
Borax	1 part

Water, a sufficient quantity.

No. 251.

GRAPHITE CEMENT.

Fire-clay mixed with water binds the graphite well and stands high temperatures.

No. 252.

CRUCIBLE LID CEMENT.

Powdered Glass.
Solution of Sodium Silicate.

An excellent compound for cementing lids on crucibles.

No. 253.

MAGNESIA CEMENT.

(For Furnaces.)

Magnesia, hard-burnt at incandescent heat	80 parts
Magnesia, light-burnt at dull-red heat	20 parts

Make this mixture into a paste with water. A small portion of asbestos fibre will prevent cracking. The water must be driven off very slowly.

No. 254.

OXY-CHLORIDE CEMENT.

(Stone Cement.)

Solution Magnesium Chloride.
Magnesium Oxide, a sufficient quantity.

If the magnesium chloride is pure, *i.e.*, free from potassium or calcium chloride, then a solution of 18° Bé. can be used, otherwise its specific gravity should be 20° to 22° Bé.

The light magnesium oxide should be freshly calcined, or it is unsatisfactory for cement composition. Silica, wood pulp or ground wood are used as diluents.

Contributed by the Chairman:

TALC PREPARATIONS.

The following formulas are abstracted from the 1914 Report of the Society of Talc Industry in Austria-Hungary (*Ph. Ztg.*, 1915, p. 297) and other sources. The submitted formulas for pharmaceutical, cosmetic and technical preparations should be of interest to the pharmacist.

No. 255.

BORATED TALC.

I.

Boric Acid	250 Gm.
Talc	2250 Gm.
Oil of Geranium	15 mils

II.

Boric Acid	125 Gm.
Zinc Stearate	125 Gm.
Talc	2250 Gm.
Perfume Oil	15 mils

It is, of course, necessary that the ingredients are in the form of an impalpable powder. Add the oil to the boric acid, triturate well, add the other ingredients and sift through a fine sieve or bolting cloth.

It will be noticed that Formula I contains 10 percent and Formula II 5 percent of boric acid. A great many of the so-called borated talcums in the American market contain as little as 1 percent.

No. 256.

PULVIS TALCI BORICUS.

Boric Talc Powder.

B.P. Cx.

Boric Acid	10 Gm.
Starch	10 Gm.
Talc	80 Gm.
Oil of Geranium	0.2 mil

No. 257.

VIOLET TALC.

Orris	100 Gm.
Talc	900 Gm.

Extract of Violet, sufficient.

No. 258.

PULVIS TALCI PHENOLATUS.

Carbolated Talc.

Phenol	1 Gm.
Boric Acid	16 Gm.
Talc	233 Gm.

DUSTING POWDERS.

PULVIS INSPERSORIUS—PULVIS ADSPERSORIUS.

Dusting powders are external use preparations in the form of a very fine or impalpable powder, containing medicinal ingredients. They are protective and absorbent applications possessing soothing, healing, emollient, antiseptic or astringent properties.

The diluents in dusting powders are generally talc or starch. Foot powders are a subdivision of dusting powders.

No. 259.

PULVIS ACIDI BORICI ET AMYLI.

Boric Acid and Starch Powder.

B.P. Cx.

Boric Acid,
Starch, equal parts.

No. 260.

PULVIS ACETANILIDI ET ACIDI BORICI.

Acetanilid and Boric Acid Powder.

"Boracetanile."

Acetanilid	25 Gm.
Boric Acid	75 Gm.

No. 261.

PULVIS TALCI COMPOSITUS.

Compound Talc Powder.

Magnesium Carbonate,
Alum,
Talc, equal parts.

(Jewish Hospital, Brooklyn.)

No. 262.

PULVIS ACIDI BORICI COMPOSITUS.

Compound Boric Acid Powder.

Boric Dusting Powder.

(Beasly.)

Boric Acid	10 Gm.
Zinc Oxide	30 Gm.
Starch or Talc	60 Gm.

No. 263.

PULVIS IODOFORMI ET ACIDI BORICI.

Iodoform and Boric Acid Powder.

B.P. Cx.

Iodoform	25 Gm.
Boric Acid	75 Gm.

Dusting powder for wounds and ulcers.

No. 264.

PULVIS CALOMELANOS ET ACIDI BORICI.

Calomel and Boric Acid Powder.

B.P. Cx.

Mercurous Chloride	25 Gm.
Boric Acid	75 Gm.

No. 265.

PULVIS CALOMELANOS ET AMYLI.

Calomel and Starch Powder.

B.P. Cx.

Mercurous Chloride	25 Gm.
Starch	75 Gm.

No. 266.

PULVIS CALOMELANOS ET ZINCI OXIDI.

Calomel and Zinc Oxide Powder.
B.P. Cx.

Mercurous Chloride	25 Gm.
Zinc Oxide	75 Gm.

These "calomel dusting powders" are used for syphilitic sores, ulcers, and pruritus ani.

No. 267.

PULVIS INSPERSORIUS.

Dusting Powder.

Boric Acid,
Zinc Oxide,
Talc, equal parts.
(German Hospital, Phila.)

No. 268.

PULVIS IODOFORMI ET ACIDI BORICI.

Iodoform and Boric Acid Powder.

Iodoform,
Boric Acid, equal parts.
(German Hospital, Phila.)

No. 269.

PULVIS IODOFORMI COMPOSITUS.

Compound Iodoform Powder.

Tannic Acid	2 Gm.
Bismuth Subnitrate,	
Iodoform, of each	4 Gm.
Acacia	8 Gm.

(German Hospital, Phila.)

No. 270.

PULVIS ACIDI BORICI ET BISMUTHI COMPOSITUS.

Comp. Boric Acid and Bismuth Powder.
"A. B. C. Powder."

Boric Acid,
Bismuth, Subnitrate,
Calomel, equal parts.
(Bellevue Form.)

No. 271.

PULVIS ACIDI BORICI COMPOSITUS CUM LYCOPODIO.

Compound Boric Acid Powder with Lycopodium.

Boric Acid,
Bismuth Subnitrate,
Zinc Oxide,
Lycopodium, equal parts.
(Bellevue Form.)

No. 272.

PULVIS ACIDI BORICI COMPOSITUS CUM ALUMINE.

Compound Boric Acid Powder with Alum.

Boric Acid,
Calomel,
Alum, equal parts.
(Bellevue Form.)

No. 273.

PULVIS CALOMELANOS COMPOSITUS.

Compound Calomel Powder.

Calomel,
Bismuth Subnitrate,
Starch, equal parts.
(Bellevue Form.)

No. 274.

PULVIS CARBONIS LIGNI CUM IODOFORM.

Charcoal and Iodoform Powder.

Iodoform,
Charcoal, equal parts.
(Bellevue Form.)

No. 275.

PERSPIRATION POWDER.

Salicylic Acid	10 Gm.
Bismuth Subnitrate	15 Gm.
Zinc Oleate	10 Gm.

Dr. Shoemaker recommends this against profuse or fetid perspiration.
(*Handb. Therapy*, 4 ed., p. 661.)

No. 276.

PULVIS ZINCI OLEATIS COMPOSITUS.

Compound Zinc Oleate Powder.
B.P. Cx.

Zinc Oleate	25 Gm.
Boric Acid	25 Gm.
Oil of Rose	0.1 mil
Starch	50 Gm.

Zinc oleate in powder form is also known as Dr. Shoemaker's zinc oleate.

No. 277.

PULVIS INSPERSORIUS DIACHYLATUS.

Diachylon Dusting Powder.
E.B. III.

Boric Acid	3 Gm.
Lead Stearate	9 Gm.
Starch	88 Gm.

No. 278.

PULVIS INSPERSORIUS BENZOATUS.

Benzoe-Fettpuder.

E.B. III.

Zinc Oxide,
Wheat Starch,
Talc, of each ..... 30 Gm.
Boric Acid,
Hydrous Wool-fat,
Petrolatum,
Tannic Acid, of each ..... 3 Gm.
Lycopodium ..... 18 Gm.
Tinct. Benzoin ..... 10 Gm.

Triturate the first 3 powders and divide into 2 parts. Mix one-half with the tincture of benzoin and allow to dry. Mix the other half with the fats, and triturate the 2 parts together with other ingredients and sift.

No. 279.

PULVIS INSPERSORIUS BENZOATUS.

Lux.

Zinc Oxide,
Starch,
Talc, of each ..... 30 Gm.
Tinct. Benzoin ..... 10 Gm.
Oil of Theobroma ..... 6 Gm.
Boric Acid ..... 3 Gm.

Triturate the first 4 ingredients and allow to dry. Then mix with the other ingredients and sift.

No. 280.

PULVIS INSPERSORIUS CUM ACIDO BORICO.

Boric Acid Dusting Powder.

F. M. G.

Boric Acid ..... 5 Gm.
Talc ..... 10 Gm.
Rice Starch ..... 35 Gm.

No. 281.

PULVIS METHYL-ROSANILINI COMPOSITUS.

Compound Methyl Violet Powder.
Pyoktanin Dusting Powder.

B.P. Cx.

Methyl Rosaniline ..... 10 Gm.
Boric Acid ..... 90 Gm.

Used against malignant growths as a dusting applied on cotton, or with a powder insufflator.

No. 282.

PULVIS VIOLARIS.

Violet Powder.

B.P. Cx.

Orris ..... 12.50 Gm.
Oil of Bergamot ..... 0.25 mil
Oil of Neroli ..... 0.02 mil
Starch, a sufficient quantity,

To make ..... 100 Gm.

Triturate the oils with the powdered orris, then mix in the starch, and pass through a fine sieve.

Used as a toilet powder and in the nursery, when a soluble powder is not required.

Soluble Toilet Powders consist chiefly of boric acid.

No. 283.

PULVIS INSPERSORIUS CUM BISMUTHO SUBGALLICO.

Bismuth Subgallate Dusting Powder.

Ph. Aust. VIII.

Bismuth Subgallate ..... 20 Gm.
Talc ..... 80 Gm.

No. 284.

PULVIS INSPERSORIUS CUM BISMUTHO SUBGALLICO.

Bismuth Subgallate Dusting Powder.

E.B. III.

Bismuth Subgallate ..... 20 Gm.
Wheat Starch ..... 10 Gm.
Talc ..... 70 Gm.

"Dermatol" dusting powder is an astringent and is used for wounds and skin diseases.

No. 285.

PULVIS INSPERSORIUS TANNOFORMII.

Tannoform Dusting Powder.

F. M. G.

Tannoform ..... 10 Gm.
Talc ..... 20 Gm.

An astringent dusting powder.

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and its branches shall become the property of the Association, with the understanding that they are not to be published in any other publication than those of the Association, except by consent of the Committee on Publication."—By-Laws, Chapter X, Art. III.

Reports of the meetings of the Local Branches should be mailed to the Editor on the day following the meeting, if possible. Minutes should be *plainly* written, or typewritten, with wide spaces between the lines. Care should be taken to give proper names correctly, and manuscript should be signed by the reporter.

CUBAN BRANCH.

A special meeting for the constitution of the Cuban Branch of the American Pharmaceutical Association was held Monday afternoon, July 24, at the Academy of Sciences, Havana.

Dr. Eduardo Garcia Faundo presided and Dr. Jose P. Alacan served as secretary. Doctor Faundo called the meeting to order at 3.30 P.M. A letter from J. W. England, secretary of the Council, was read, and thereafter Articles 1 to 6 of the By-laws.

Officials of the Executive Committee were elected as follows: President, Dr. Jose Guillermo Diaz; first vice-president, Dr. Manuel Johnson; second vice-president, Dr. Francisco Taquechel; secretary-treasurer, Dr. Jose P. Alacan.

On motion of Dr. Capote Messrs. Diaz, Alacan, Remirez and Miss Antonia M. Garrigo were elected delegates to the meeting of the American Pharmaceutical Association to be held in Atlantic City, September 5–9.

On motion of Dr. Jose P. Alacan the Cuban Branch of the American Pharmaceutical Association extended greetings to the Council and their fellow-members in the Association, and an expression of their appreciation for the honor which authorized them to organize this Branch. The motion was presented in the form of a resolution and made part of the minutes of the first session.

JOSE P. ALACAN, *Secretary.*

The editor is assured that the members of the American Pharmaceutical Association are much pleased that the Cuban Branch has been formed. The ties that bind the citizens of Cuba to the United States are of friendship, and pharmacy recognizes its co-workers everywhere. The association would doubtless be pleased to have other countries of America establish branches, and join in the work for which this body was organized in 1852.

NASHVILLE.

The Nashville Branch of the American Pharmaceutical Association met in joint session with the Nashville Drug Club, July 20. Dr. J. O. Burge presided.

After the minutes of the previous meeting were read and approved, a motion was made on the part of the Nashville Drug Club to have the officers of the Nashville Branch, A. Ph. A., become associate members of the former organization.

Ira B. Clark reported on the meeting of the Tennessee Pharmaceutical Association, held at Monteagle. He stated that the Association had decided to await the report of F. H. Freericks on a model pharmacy law, which he is now preparing, before taking action in drafting a State law. E. F. Trolinger also reported on the State Association meeting and gave a glowing account of the formation of a new secret society, known as the M. A. T. Club. The organization started out with a membership of 65, only the sterner sex being eligible to membership. Mr. Trolinger spoke of the initiation ceremonies which prepare these jolly good fellows for the rights and privileges of the organization. So pleasing was the result that a national organization is contemplated.

The president of the Branch appointed the following committees and constituted as follows. Program: E. A. Ruddiman, E. F. Trolinger and W. R. White. Membership: Ira B. Clark, C. C. Young, J. O. Burge. Pub-

licity: W. R. White, E. A. Ruddiman, L. S. Pully, R. L. Eves, J. O. Burge, R. J. Kleiser and J. T. McGill. Abstracts: J. B. Sand, J. O. Burge and J. R. Mansfield. Legislative: G. A. Blodau, C. C. Young and F. L. Smith.

The new United States Pharmacopœia and National Formulary were considered, abstracts were read, and the changes made in the two revisions freely discussed.

Arrangements for the boat ride were announced for July 26.

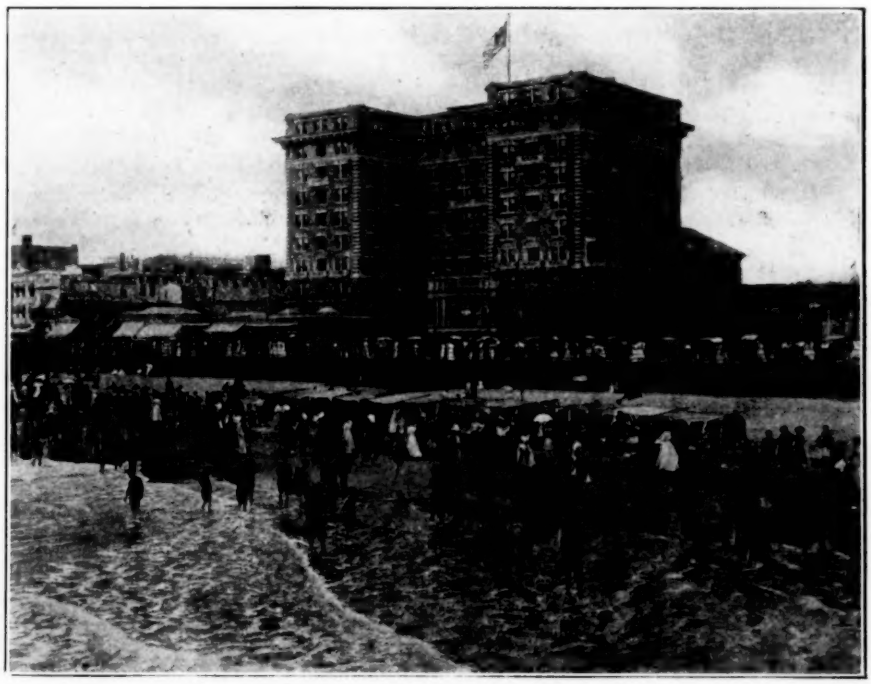
WILLIAM R. WHITE, *Secretary.*

THE BOAT RIDE.

The boat ride on July 26, participated in by Nashville druggists and under the auspices of the Nashville Drug Club, proved to be a most enjoyable affair.

The finely equipped steamer *Robert Rhea* was chartered for the occasion and about 500 guests enjoyed the Club's first annual outing. A band of string instruments furnished music for the dance. Refreshments of all kinds were plentifully supplied. Nearly every retail and wholesale drug house of Nashville was represented, traveling men and members of the Board of Pharmacy, and many ladies graced the occasion.

The event was so successful and enjoyable that it is contemplated to make a boat ride, with a similarly constituted party, an annual event.



HOTEL CHALFONTE—HEADQUARTERS, AMERICAN PHARMACEUTICAL ASSOCIATION, SEPTEMBER 5-9, 1916

SEVENTEENTH ANNUAL MEETING OF THE AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES, AND TWELFTH ANNUAL MEETING OF THE NATIONAL ASSOCIATION OF BOARDS OF PHARMACY

TO BE HELD IN PHILADELPHIA, AUGUST 31, SEPTEMBER 1 AND 2, 1916.

The next annual conventions of the National Association of Boards of Pharmacy and of the American Conference of Pharmaceutical Faculties will be held in Philadelphia, August 31, September 1–2, 1916; during the week preceding the convention of the American Pharmaceutical Association to be held in Atlantic City beginning Tuesday, September 5, at 11 A.M. American Pharmaceutical Association Headquarters at Hotel Chalfonte.

OFFICERS.

American Conference of Pharmaceutical Faculties: President, H. V. Arny; vice-president, R. A. Lyman; secretary-treasurer, Wilber J. Teeters; chairman of executive committee, J. A. Koch.

National Association of Boards of Pharmacy: President, J. C. Burton; secretary, H. C. Christensen; chairman of executive committee, Lawrence C. Lewis.

HEADQUARTERS AND HOTEL RATES.

The Rittenhouse Hotel, Twenty-second and Chestnut Streets, Philadelphia, will be headquarters for both American Conference of Pharmaceutical Faculties and National Association of Boards of Pharmacy.

The Rittenhouse has made the following rates:

Single room with bath, $2.50 per day.

Two single rooms with private bath between, $2.00 per day.

Double rooms, two beds and private bath, $3.50 for two.

It is suggested that members desiring to secure accommodations write to the Rittenhouse Hotel and make reservations at as early a date as possible.

ENTERTAINMENT.

The Philadelphia Branch of the American Pharmaceutical Association is arranging to tender the visiting delegates and their ladies a trip to Willow Grove Park, with dinner at that resort Friday evening, September 1.

Other entertainment features, sightseeing, etc., will probably be arranged for those who prefer to stay over in Philadelphia Sunday and Monday, September 3–4, going to Atlantic City Monday evening or Tuesday morning for the A. Ph. A. Convention, the first session of which is held Tuesday morning, September 5, at 11 o'clock.

TRANSPORTATION.

Arrangements have been made with officials of the Pennsylvania Railroad to attach special Pullman coaches to their train "Eastern Express," No. 8 daily, leaving Chicago, Union Station 3.15 P.M., August 29, arriving in Philadelphia 5.50 P.M. the next day (Wednesday, August 30). It is hoped that all who can come by way of Chicago will arrange to join the party taking this train.

Choice of several routes and round-trip tickets from Chicago, good for thirty days, may be had at Summer Tourist Rates varying from $31.70 to $35.00. Pullman berth from Chicago to Philadelphia $4.50 additional.

Route desired must be specified at the time of purchase of round trip ticket. Upon notice to conductor, stop-over privileges may be had coming or going, at any point on the Pennsylvania system, without limit and without deposit.

Those wishing Pullman reservation on special cars, leaving Chicago at 3:15 Tuesday afternoon, August 29, should make reservations at as early a date as possible after August 15. Further information may be had by addressing Mr. T. R. Wilt, City Passenger Agent, Pennsylvania Lines, Chicago, Ill.

It is suggested that the report of the Transportation Committee of the American Pharmaceutical Association be consulted. See pp. 768-771, July issue.

NATIONAL ASSOCIATION OF BOARDS OF PHARMACY.

The Rittenhouse Hotel, at 22nd and Chestnut Streets, will be headquarters. Meetings will probably be held in the Bourse Building, located between Chestnut and Market Streets, and between Fourth and Fifth Streets.

TENTATIVE PROGRAM.

Thursday, August 31, 1916.

10.00 A.M. First Session. 1. Call to order by President. 2. Opening with Prayer. 3. Address of Welcome. 4. Response by R. H. Walker, Gonzales, Texas. 5. Roll Call of States. 6. Appointment of Committee on Credentials.

2.00 P.M. Second Session. 1. President's Address. 2. Appointment of Committee on President's Address. 3. Report of Secretary. 4. Report of Treasurer. 5. Appointment of Nominating Committee. 6. Report of Credential Committee. 7. Report of Executive Committee. 8. Appointment of Committee on Executive Committee's Report.

Friday, September 1, 1916.

10.00 A.M. Third Session. 1. Report of Legislative Committee. 2. Report of Committee on President's Address. 3. Report of Committee on Executive Committee's Report. 4. Report of Syllabus Committee. 5. General Discussion.

2.00 P.M. Fourth Session. 1. Report of Advisory Examination Committee. 2. General Discussion. 3. Reports of Standing Committees. 4. Reports of Special Committees. 5. Unfinished Business. 6. New Business. 7. Appointment of Special Committees. 8. Report of Nominating Committee. 9. Election and Installation of Officers. 10. Final Adjournment to be taken after Joint Conference with A. C. P. F. to be held on Saturday, September 2.

JOINT SESSIONS OF THE BOARDS AND FACULTIES, PHILADELPHIA

TENTATIVE PROGRAM.

Saturday, September 2, 1916.

President, H. V. Arny, Presiding.

Morning—10 o'clock precisely. Introductory Remarks by Representatives of the Joint Program Committee. Addresses on Subjects of Mutual Interest—by the Presidents of the Boards and Faculties, Messrs. Burton and Arny. Discussion of Addresses: Secondary Schools and Their Relationship to Colleges of Pharmacy. An Informal Discussion—led by Dean Wulling. Report of the Joint Committee on the Relationship of the Colleges with the Boards. Report of Committee on Prerequisite Arguments. Miscellaneous Business.

1.00 P.M. Adjournment.

President, John C. Burton, Presiding.

Afternoon—3 o'clock precisely. Report of Joint Committee on Questions and Answers. Helpful Criticisms of Colleges of Pharmacy—led by a Board Member. Helpful Criticisms of State Boards—led by a Faculty Member. Uniform Requirements for the Practice of the Profession of Pharmacy in the United States—Advantages of Such Requirements—Disadvantages—and How Obtained—by Dr. C. B. Jordan. Report of the Joint Committee on Higher Educational Standards. Miscellaneous Business.

6.00 P.M. Adjournment.

An evening session will be held, if sufficient business is presented or develops. Adjourned sessions of the Boards and Faculties will also be held, if necessary or desirable.

AMERICAN PHARMACEUTICAL ASSOCIATION

Organized: Philadelphia, 1852 — Incorporated: Washington, D. C., 1888

OFFICIAL ROSTER FOR 1915-1916 *

GENERAL OFFICERS.

President—WILLIAM C. ALPERS.....1353 Central Ave., Cleveland, Ohio
Honorary President—FABIUS C. GODBOLD.....5601 Rosemary Pl., New Orleans, La.
First Vice-President—C. H. LAWALL.....39 South Tenth St., Philadelphia, Pa.
Second Vice-President—E. A. RUDDIMAN.....1916 Adelicia St., Nashville, Tenn.
Third Vice-President—LINWOOD A. BROWN.....425 Transylvania Park, Lexington, Ky.
General Secretary—WILLIAM B. DAY.....701 So. Wood St., Chicago, Ill.
Treasurer—HENRY M. WHELPLEY.....2342 Albion Place, St. Louis, Mo.
Reporter on the Progress of Pharmacy—J. A. KOCH.....Bluff and Pride Sts., Pittsburgh, Pa.
Editor of the Journal—E. G. EBERLE.....253 Bourse Bldg., Philadelphia, Pa.
Local Secretary—CHARLES HOLZHAUER.....732 High St., Newark, N. J.

OFFICERS-ELECT FOR 1916-1917.

(To be installed at the 64th Annual Convention.)

President—FREDERICK J. WULLING.....University of Minnesota, Minneapolis, Minn.
First Vice-President—LEONARD A. SELTZER.....32 Adams St., W., Detroit, Mich.
Second Vice-President—LUCIUS E. SAYRE.....1323 Ohio St., Lawrence, Kans.
Third Vice-President—PHILIP ASHER.....1606 St. Charles Ave., New Orleans, La.
Members of Council, 1916-1917—JAMES H. BEAL.....801 West Nevada St., Urbana, Ill.
WILLIAM C. ALPERS.....Cleveland, Ohio
HARRY B. MASON.....P. O. Box 484, Detroit, Mich.

OFFICERS OF THE COUNCIL FOR 1915-1916.

Chairman—E. G. EBERLE.....253 Bourse Bldg., Philadelphia, Pa.
Vice-Chairman—JOHN G. GODDING.....278 Dartmouth St., Boston, Mass.
Secretary—JOSEPH W. ENGLAND.....415 North Thirty-third St., Philadelphia, Pa.

MEMBERS OF THE COUNCIL FOR 1915-1916.

(Elected by the Association.)

CHARLES CASPARI, JR., Baltimore, Md.....Term expires 1916
CHARLES E. CASPARI, St. Louis, Mo.....Term expires 1916
JOHN G. GODDING, Boston, Mass.....Term expires 1916
OTTO F. CLAUS, St. Louis, Mo.....Term expires 1917
M. I. WILBERT, Washington, D. C.....Term expires 1917
GEORGE M. BERINGER, Camden, N. J.....Term expires 1917
CASWELL A. MAYO, New York, N. Y.....Term expires 1918
F. M. APPLE, Philadelphia, Pa.....Term expires 1918
H. V. ARNY, New York, N. Y.....Term expires 1918

(Elected by Local Branches.)

H. P. HYNSON, Baltimore Branch.....Baltimore, Md.
C. T. P. FENNEL, Cincinnati Branch.....Cincinnati, Ohio
C. M. SNOW, Chicago Branch.....Chicago, Ill.
GEORGE B. KAUFFMAN, Columbus Branch.....Columbus, Ohio
SAMUEL T. HENSEL, Denver Branch.....Denver, Colo.
WILLIAM R. WHITE, Nashville Branch.....Nashville, Tenn.
E. H. LAPIERRE, New England Branch.....Cambridge, Mass.
THOMAS D. MCELHENIE, New York Branch.....New York, N. Y.
L. C. HOPP, Northern Ohio Branch.....Cleveland, Ohio
F. J. WULLING, Northwestern Branch.....Minneapolis, Minn.
F. E. STEWART, Philadelphia Branch.....Philadelphia, Pa.
J. A. KOCH, Pittsburgh Branch.....Pittsburgh, Pa.
CLARISSA M. ROEHR, San Francisco Branch.....San Francisco, Cal.
J. A. WILKERSON, St. Louis Branch.....St. Louis, Mo.
S. L. HILTON, Washington, D. C., Branch.....Washington, D. C.
W. A. HALL, Detroit Branch.....Detroit, Mich.
C. H. ROGERS, West Virginia Branch.....Morgantown, W. Va.

(Members of Council Ex-Officio.)

The President, Honorary President, Vice-Presidents, General Secretary, Treasurer, Reporter on the Progress of Pharmacy, Secretary of the Council, Local Secretary, Historian, and the Chairmen of the Sections.

OFFICERS OF THE HOUSE OF DELEGATES FOR 1915-1916.

Chairman—H. P. HYNSON.....423 North Charles St., Baltimore, Md.
First Vice-Chairman—F. W. NITARDY.....1414 St. Paul St., Denver, Colo.
Second Vice-Chairman—O. F. CLAUS.....3513 Herbert St., St. Louis, Mo.
Secretary—JEANNOT HOSTMANN.....115 West 68th St., New York, N. Y.

* Please notify General Secretary of any errors or omissions discovered.

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(Elected by the Several Sections.)

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Secretary—E. L. NEWCOMB.....719 Sixth Ave., S. E., Minneapolis, Minn.

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MISS ZADA M. COOPER.....124 Bloomington St., Iowa City, Iowa
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(Appointed by Scientific Section.)

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ROBERT P. FISCHELIS.....Philadelphia, Pa.

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F. J. WULLING.....Minneapolis, Minn.

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F. G. UHLICH.....St. Louis, Mo.

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ADAM WIRTH.....New Orleans, La.

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HENRY KRAEMER, Philadelphia, Pa.....Term expires 1916
EUSTACE H. GANE, New York City.....Term expires 1916
B. L. MURRAY, Rahway, N. J.....Term expires 1916
W. A. PUCKNER, Chicago, Ill.....Term expires 1916
JOHN G. ROBERTS, Philadelphia, Pa.....Term expires 1917
OTTO RAUBENHEIMER, Brooklyn, N. Y.....Term expires 1917
GEORGE D. ROSENGARTEN, Philadelphia, Pa.....Term expires 1917
M. I. WILBERT, Washington, D. C.....Term expires 1917
GEORGE M. BERINGER, *Chairman*, Camden, N. J.....Term expires 1918
H. H. RUSBY, Newark, N. J.....Term expires 1918
F. R. ELDRED, Indianapolis, Ind.....Term expires 1918
JOHN M. FRANCIS, Detroit, Mich.....Term expires 1918
ELMER E. WYCKOFF, Brooklyn, N. Y.....Term expires 1919
J. A. KOCH, Pittsburgh, Pa.....Term expires 1919
L. D. HAVENHILL, Lawrence, Kan.....Term expires 1919
E. L. NEWCOMB, Minneapolis, Minn.....Term expires 1919

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W. L. SCOVILLE, Detroit, Mich.....Term expires 1916
W. H. GLOVER, Lawrence, Mass.....Term expires 1916
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I. A. BECKER, Chicago, Ill.....Term expires 1917
CLARISSA M. ROEHR, San Francisco, Calif.....Term expires 1917
CLARENCE G. SPALDING, New Haven, Conn.....Term expires 1918
E. FULLERTON COOK, Philadelphia, Pa.....Term expires 1918
WILLIAM GRAY, Chicago, Ill.....Term expires 1918
THEO. D. WETTERSTROEM, Cincinnati, Ohio.....Term expires 1919
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WM. L. CLIFFE, Philadelphia, Pa.....Term expires 1919
OTTO RAUBENHEIMER, *Chairman*, Brooklyn, N. Y.....Term expires 1920
HENRY P. HYNSON, Baltimore, Md.....Term expires 1920
M. I. WILBERT, Washington, D. C.....Term expires 1920

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JOHN C. WALLACE, New Castle, Pa.....Term expires 1917
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THOMAS F. MAIN, New York City.....Term expires 1919
JAMES H. BEAL, *Chairman*, Urbana, Ill.....Term expires 1920

GENERAL COMMITTEES.

(Appointed by the President.)

DRUG REFORM.

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E. N. GATHERCOAL.....Chicago, Ill.

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E. O. ENGSTROM.....Pittsfield, Mass.

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J. W. ENGLAND.....Philadelphia, Pa.

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WILLIS G. GREGORY, 344 Richmond Ave., Buffalo, N. Y.....Term expires 1917
P. GERHARD ALBRECHT, Cleveland School of Pharmacy, Cleveland, Ohio.....Term expires 1918
CHARLES CASPARI, JR., University of Maryland, Baltimore, Md.....Term expires 1919
E. G. EBERLE, Philadelphia Drug Exchange, Bourse Bldg., Philadelphia, Pa.....Term expires 1920
HARRY B. MASON, P. O. Box 484, Detroit, Mich.....Term expires 1921
GEORGE M. BERINGER, 501 Federal St., Camden, N. J.....Term expires 1922

PHYSIOLOGICAL TESTING.

E. M. HOUGHTON, M.D., *Chairman*.....Detroit, Mich. WILLIAM A. PEARSON.....Philadelphia, Pa.
CHARLES R. ECKLER.....Indianapolis, Ind. PAUL S. PITTENGER.....Philadelphia, Pa.

REVISION OF THE CONSTITUTION AND BY-LAWS.

J. W. ENGLAND, *Chairman*.....Philadelphia, Pa. JAMES H. BEAL.....Urbana, Ill.
H. M. WHELPLEY.....St. Louis, Mo. G. M. BERINGER.....Camden, N. J.
HARRY B. MASON.....Detroit, Mich.

STATUS OF PHARMACISTS IN THE GOVERNMENT SERVICE.

SAMUEL L. HILTON, *Chairman*.....Washington, D. C. WM. R. WHITE.....Nashville, Tenn.
WILLIAM C. ANDERSON.....Brooklyn, N. Y. FRED T. GORDON.....Philadelphia, Pa.
W. B. DAY.....Chicago, Ill.

UNITED STATES PHARMACOPŒIA.

REID HUNT, Boston, Mass.....Term expires 1916
L. D. HAVENHILL, *Chairman*, Lawrence, Kan.....Term expires 1917
L. F. KEBLER, Washington, D. C.....Term expires 1918
E. N. GATHERCOAL, Chicago, Ill.....Term expires 1919
E. FULLERTON COOK, Philadelphia, Pa.....Term expires 1920
E. H. LAPIERRE, Cambridge, Mass.....Term expires 1921
H. A. B. DUNNING, Baltimore, Md.....Term expires 1922
HERMANN ENGELHARDT, Baltimore, Md.....Term expires 1923
A. B. LYONS, Detroit, Mich.....Term expires 1924
WILLIAM MITTELBACH, Boonville, Mo.....Term expires 1925

WEIGHTS AND MEASURES.

HARRY V. ARNY, *Chairman*.....New York, N. Y. PHILIP ASHER.....New Orleans, La.
CHARLES W. JOHNSON.....Seattle, Wash. CLYDE M. SNOW.....Chicago, Ill.
GEORGE D. TIMMONS.....Valparaiso, Ind.

WILLIAM PROCTER, JR., MEMORIAL FUND.

J. F. HANCOCK, *Chairman*.....Baltimore, Md.
CHARLES CASPARI, JR.....Baltimore, Md.
A. R. L. DOHME.....Baltimore, Md.
B. F. FAIRCHILD.....New York, N. Y.
CASWELL A. MAYO.....New York, N. Y.
E. G. EBERLE.....Philadelphia, Pa.
J. L. LENGFELD.....San Francisco, Calif.
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PARKER COOK.....Baltimore, Md.
J. K. LILLY.....Indianapolis, Ind.
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W. S. RICHARDSON.....Washington, D. C.

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TIME AND PLACE OF NEXT MEETING.

MARTIN L. PORTER, *Chairman*.....Danforth, Me.
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COMMITTEE TO CONFER WITH THE MANUFACTURING HOUSES WITH A VIEW TO CONSERVING TO THE RETAIL PHARMACISTS THE MANUFACTURE OF U. S. P. AND N. F. PREPARATIONS.

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N. W. D. A., 1916.

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ORGANIZATION OF LOCAL BRANCHES, 1915–1916.

(The General Secretary should have prompt notice of corrections and changes.)

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The following were elected delegates to the Atlantic City meeting of the American Pharmaceutical Association: Drs. J. G. Diaz, J. P. Alacan, F. Remirez and Miss Antonia M. Garrigo.

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AMERICAN PHARMACEUTICAL ASSOCIATION

PROGRAM FOR ATLANTIC CITY MEETING.

Monday, September 4 (Labor Day).

7.30 P.M. Meeting of the Council.

Tuesday, September 5.

11.00 A.M. First General Session. Meeting of Committee on Nominations. Meeting of Committee on Resolutions.
2.00 P.M. Section on Education and Legislation. Commercial Section. Women's Section.
7.30 P.M. Meeting of the Council. House of Delegates.
9.30 P.M. President's Reception.

Wednesday, September 6.

9.30 A.M. Second General Session.
12.30 P.M. Luncheon of College Alumni.
2.00 P.M. Section on Education and Legislation. Section on Practical Pharmacy and Dispensing (Pharmacopœias, Formularies and Standards). Commercial Section.
7.30 P.M. Meeting of the Council. Joint Session of Section on Education and Legislation, the A. C. P. F. and the N. A. B. P. House of Delegates.

Thursday, September 7.

9.30 A.M. Scientific Section. Section on Practical Pharmacy and Dispensing (Pharmacopœias, Formularies and Standards).
2.00 P.M. Scientific Section. Section on Practical Pharmacy and Dispensing (Pharmacopœias, Formularies and Standards). Women's Section.
7.30 P.M. Meeting of the Council (Reorganization). House of Delegates.

Friday, September 8.

9.30 A.M. Meeting of the Council. Historical Section. Scientific Section.
2.00 P.M. Final General Session.

Saturday, September 9.

Sightseeing.

THE ENTERTAINMENTS.

Local Secretary Charles Holzhauer advises that arrangements for the entertainments have been completed. One of the features will be a Theatre Party, provided by the New Jersey Association and the New York and Philadelphia Branches of the American Pharmaceutical Association; following this refreshments will be served. Opportunities will be provided for sailing and fishing; the use of roller chairs and admission to pier. It is contemplated to send out programs, conveying also other information. Everyone can be assured of a fine entertainment for every vacant period and the ladies have been specially provided for.

HOUSE OF DELEGATES, A. PH. A.

ATLANTIC CITY.

TENTATIVE PROGRAM.

Tuesday, September 5, 1916.—*Afternoon,* 4 *o'clock Precisely.*

Possibilities in Organization .....Chairman's Address.
The Future of the House of Delegates .....Vice-Chairman's Address.
Plans for the Reorganization of the House of Delegates .....Secretary's Address.

The addresses of the Officers will constitute a report of the "Committee on the House of Delegates," provided for at its last meeting.

The Federation of all Pharmaceutical Bodies—Informal Discussion led by..Dr. F. J. Wulling.
Calling of Roll and Introduction of Resolutions.
Appointment of a Committee on Credentials.
Miscellaneous Business.

Wednesday, September 6, 1916.—*Afternoon,* 4 *o'clock Precisely.*

Report of Committee on the Pricing of Prescriptions—Separate Papers by Harry B. Mason, Chairman, F. W. Nitardy and Hugh Craig—Discussion led by F. W. R. Perry and George M. Schettler.
Consideration of Resolutions.
Unfinished Business.
Miscellaneous Business.

Friday, September 9, 1916—*Morning,* 11 *o'clock Precisely.*

Consideration of Matters Referred to the House of Delegates.
Communications from General Sessions and from the Council.
Unfinished Business.
Election and Installation of Officers.
Adjournment.

ATLANTIC CITY HOTEL RATES.

Chalfonte, headquarters, one person in room, $4.00; two in room, $8.00; two in room with bath, $10.00. Haddon Hall, one person in room, $4, $5, $6, $7; one person in room, with bath, $9.00; two in room, $7, $8, $9, $10, $12, $14; two in room, with bath, $9, and up. Hotel Strand, two persons in room, $8 to $10; two persons in room, with bath, $12. Marlborough-Blenheim, one person, $6 per day, and up. Royal Palace, one person in room, $3.50 and $4; two persons in room, $7 and $8; one person in room, with bath, $5, $6, $7; two in room, with bath, $9, $10, $11, $12. Hotel Traymore, one person in room, $7, $8, $10, $11, $12; European plan, one person in room, $3, $4, $5, $7, $8, $9; two in room, $10 to $16; European plan, two in room, $5 to $10. Hotel Bothwell, $3 and $3.50 per day, running water. The Mullica, $2 and $3 per day; European plan, $1 per day. The Shoreham, $2 per day, two in room; $3 per day, with bath. The Grand Atlantic, $2.50 per day, two in room; $3 per day, single rooms. The Wiltshire, $3.50, $4, $5, $6, per day, single rooms; $2.50 to $5, two in room. The Seaside, $3.50 and $4, two in room.

Prices are American plan unless otherwise indicated.

PROGRAMS OF THE SECTIONS

(THESE ARE TENTATIVE ONLY, AND INCOMPLETE)

SCIENTIFIC SECTION.

Officers: Chairman, W. L. Scoville; first vice-president, L. A. Brown; second vice-president, J. L. Turner; secretary, E. L. Newcomb.

Sessions: Thursday, September 7, 9.30 A.M. and 2.00 P.M., and Friday, September 8, 9.30 A.M.

PROGRAM.

A Continued Study in Adsorption, Illustrated with Experiments.....J. U. Lloyd.
Corn Oil and Its Hydrogenation Product for Medicinal Use.....L. E. Sayre.
Diagnostic Reagents .....F. E. Stewart.
Physical Phenomena Pertaining to Solution and Crystallization .....H. J. Novack.
Some Results of the Harrison Law.....H. C. Wood, Jr.
Vegetable Taxonomy .....O. A. Wall.
The Physiological Standardization of Cannabis .....W. A. Pearson.
Polarized Light in Vegetable Histology.....C. W. Ballard.
A Rapid, Accurate Method for the Determination of Organically and Inorganically Combined Iodine .....Wm. J. Thompson and J. P. Snyder.
.....A. Bolenbaugh.
The Alkaloids of Belladonna, Lily .....F. B. Kilmer.
Laboratory Notes on Fowler's Solution, Spirit of Nitrous Ether and Quinine Sulphate .....H. Engelhardt and O. E. Winters.
Chemicals Added to the U. S. P. IX .....Otto Raubenheimer.
Sulphurous Acid, Its Extemporaneous Preparation .....Otto Raubenheimer.
Hexamethylenamine .....E. V. Howell.
A Review of the Review of the Requirements and Methods of Assay of the U. S. P. IX and the N. F. IV.....M. I. Wilbert.
Adulteration of White Beeswax .....K. F. Ehmann.

SECTION ON PRACTICAL PHARMACY AND DISPENSING.

(Pharmacopœias, Formularies and Standards.)

Officers: Chairman, Joseph Weinstein; secretary, Hugh B. SeCheverell; associate, Franz F. Berg.

Sessions: Wednesday, September 6, 2.00 P.M.; Thursday, September 7, 9.30 A.M. and 2.00 P.M.

PROGRAM.

The report of the Committee on Pharmacopœias and Formularies is being prepared by Mrs. St. Claire R. Gay, as chairman, and members of the Committee, Messrs. Apple, McCartney and Currens.

J. Carleton Wolfe is arranging a Symposium on Prescriptions.

Chairman Joseph Weinstein writes that he has been promised and will have papers by Messrs. Hynson, Engelhardt, Fischelis, Osseward, Roon, Wilbert, Jones, Lascoff, Raubenheimer, Diner, Wimmer, Hostmann, Schaefer, Diekman, Arny, Mansfield, Niece, Latham and Lehman. So the prospects are good for an exceedingly interesting program.

SECTION ON LEGISLATION AND EDUCATION.

Officers: Chairman, Frank H. Freericks; secretary, R. A. Kuever; associates, W. S. Richardson, Geo. B. Topping and Zada M. Cooper.

Sessions: Tuesday, September 5, 2.00 P.M., Wednesday, September 6, 2.00 P.M. and 7.30 P.M.

PROGRAM.

Tuesday—2 o'clock. First Session.

Address of the Chairman ..... Frank H. Freericks.
Report of the Secretary ..... R. A. Kuever.
Report of the Committee on Patents and Trademarks ..... F. E. Stewart, Chairman.
Report of the Committee on National Legislation ..... John C. Wallace, Chairman.
Report of the Committee on Drug Reform ..... L. E. Sayre, Chairman.
Report of the Committee on Regulations for the Transportation of Drugs by Mail ..... Benj. L. Murray, Chairman.
Report of the Committee on Survey of the Pharmaceutical Teaching Institutions ..... Hugh Craig, Chairman.
A Plea for a Permanent Professional Tenure of the Pharmacist ..... C. F. Nelson.
Coöperation between State Medical and State Pharmacy Boards.—The enforcement of all laws pertaining to the preparation, purity, distribution and sale of drugs under their joint supervision by Drug Commissioners acting under their joint authority ..... Edward H. Thiesing.
Practical Drug Experience before Entering College ..... Otto Raubenheimer.
Nomination of Officers.

Wednesday—2 o'clock. Second Session.

Consideration of the Proposed New Features for a Modern Pharmacy Law.
Reading of Papers.
Further Nominations and Election of Officers.

7.30 o'clock. Third Session.

This will be a joint session of the Section on Education and Legislation with the American Conference of Pharmaceutical Faculties and the National Association of Boards of Pharmacy. The program has not been completed but arrangements are going forward which will make this an exceedingly interesting session.

SUBJECTS FOR PAPERS.

Chairman Frank H. Freericks has prepared the following subjects for papers and asks for contributions, but he does not desire to limit the members to this selection. Papers should be sent to his address, 1004–1005 Mercantile Library Building, Cincinnati, Ohio. The title of the paper should be sent in at once to insure a place on the program.

What is a Potent Drug? A definition, and its advantage.

Publication of Potent Drug Content in All Ready-made Medicines. Is it desirable?

Potent Drugs and Preparations Containing Them Dispensed by Physicians and by Pharmacists on Physicians' Prescriptions. Does the Public Welfare require record for identification, or is the alternative direct disclosure of content?

Does Public Policy Require that the Right to Prepare Medicinal Compounds be Limited to the Pharmacists?

Who Should Properly be Authorized to Distribute Medicines of Any and All Character?

Pharmacy Board Members to be Graduates in Pharmacy.

Is it Desirable to Provide by Law for the Qualification of Teachers in our Colleges and Schools of Pharmacy?

Reciprocal Registration. How can it be facilitated and more generally adopted?

The National Association of State Boards of Pharmacy. Uniformity of requirements, and more general coöperation between State Boards. A legally authorized basis for cooperation and mutual agreement.

Has the Assistant Pharmacist a Recognized Position of Value under our Pharmacy Laws? Is it worth while to continue provisions for his registration?

Coöperation between State Medical and Pharmaceutical Boards. Joint control over the preparation, distribution, purity and sale of drugs.

Coöperation between Medical and Pharmaceutical Colleges. Exchange Professors. Possible advantage of the student both of medicine and pharmacy.

What is a Poison?

A Federal Pharmacy Law and Constitutional Limitations.

Is Practical Experience in Retail Pharmacy Desirable as a Prerequisite of College Graduation?

Are Privately Owned Schools and Colleges of Pharmacy Objectionable and Not Likely to Produce the Best Results?

Is the Executive Ownership and Use of Coined Names for Chemicals, Drugs and Their Preparations Objectionable? Should it be subject to limitation and restriction?

The Federal Narcotic Law (Harrison Law). Its enforcement. Its amendment.

What Can State Associations Do to Create a Greater Interest Among Retail Pharmacists for Subjects Pertaining to Pharmacy as a Profession?

Registration of the Pharmacy or of the Pharmacist. What should be the proper requirement?

SECTION ON COMMERCIAL INTERESTS.

Officers: Chairman, R. S. Lehman; secretary, J. C. McGee; associates, E. H. Thiesing, W. H. Cousins and G. H. P. Lichthardt.

Sessions: Tuesday, September 5, 2.00 P.M., and Wednesday, September 6, 2.00 P.M.

PROGRAM.

Address of the Chairman ..... Robert S. Lehman.
What is Wrong with the Business End of Pharmacy ..... Jacob Diner.
System and Vigilance—the Great Essentials of Business ..... Louis Schulze.
A Couple of Time-savers for Retail Druggists ..... David M. Fletcher.
An Appeal to the Retail Druggists to Take Greater Interest in U. S. P. and N. F. Preparations ..... Zeb W. Rike.
A Moving Window Display—a demonstration ..... Otto Raubenheimer.
History of Substitution, and *Quid pro Quo* in U. S. P. IX—the two papers constitute a part of the Symposium on Substitution ..... Otto Raubenheimer.
Jeopardizing the Pharmacist's Reputation for Fair Dealing ..... Robert P. Fischelis.
Accountancy and Business Administration—an address ..... Horace S. Pace.

SECTION ON HISTORICAL PHARMACY.

Officers: Chairman, Charles Holzhauer; secretary, G. G. Marshall; historian, E. G. Eberle.

Sessions: Only one session of this Section will be held, Friday, September 8, 9.30 A.M.

It will be impossible for Mr. Marshall to be present and, by request, President W. C. Alpers has kindly consented to act for him.

PROGRAM.

Address of the Chairman ..... Charles Holzhauer.
Report of the Secretary ..... George G. Marshall.
Nomination of Officers.
Presentation of a life size picture of Herman Hager, dedicated by the New York Deutscher Apotheker Verein ..... Otto Raubenheimer.
History of the New Jersey Pharmaceutical Association ..... E. A. Sayre.
Some Exponents of Pharmacy ..... John F. Patton.
Pharmacy in New Jersey in the Sixties, as Recalled by an Apprentice ..... L. E. Sayre.
Early Experiences in the Drug Trade ..... Joseph L. Lemberger.
History of Mercury ..... Otto Raubenheimer.
Ten Years of New Jersey Pharmaceutical Association ..... J. F. Llewellyn.
Pharmacy and Medicine of Sir Walter Scott ..... Arthur Linton.
Happenings in Pharmacy a Century Ago ..... Otto Raubenheimer.
Historical Fragments ..... Edward Kremers.
Election of Officers.
Installation of New Officers.

WOMEN'S SECTION.

Officers: President, Mrs. G. D. Timmons; honorary president, Mrs. F. C. Godbold; first vice-president, Mrs. W. Bruce Phillips; second vice-president, Mrs. E. A. Ruddiman; third vice-president, Miss Jean Gordon; historian, Miss Bertha Ott; secretary, Miss Anna G. Bagley.

Sessions. Tuesday, September 5, 2.00 P.M., and Thursday, September 7, 2.00 P.M.

The President, Mrs. G. D. Timmons, has issued a call, extending an invitation to all the ladies, who will be in Atlantic City in attendance on the convention of the American Pharmaceutical Association, to participate in the proceedings. A general request for papers has been sent out and an interesting program is being prepared. An informal reception will be held during the first session, Tuesday afternoon, at 2.00 P.M.

THINKING FOR YOURSELF

Suddenly a man wakes to the realization that he must do his own thinking—that he is as a swimmer who beyond the life ropes or the beach guard's reach must depend on his own powers. At the top of any going concern one sees commanders who are envied, because apparently they can "take it easy" or continue at a driving pace, just as they choose. The underlings must keep early and late hours, they must fetch and carry, they must obey and serve without back talk, and though by their industry (they think) the business thrives, they only get a pittance for pay compared with what they deserve.

But possibly the thought has not occurred to the man at the bottom that the man at the top got there by the survival of the fittest, because he endured the heat and burden of the day. He has made the places for the subordinates to take. He has created the opportunities into which they step. There would be no snug salaried berth if he had not gone before to prepare the way.

Nothing is easier than to get the hammer out and perform in an anvil chorus, like frogs in a marsh, with voices blaming and abusing the man higher up. The passengers meet in the cabin and pass resolutions condemning the captain and telling him how to run the boat. But alone on the mist-hung bridge he stands and is responsible for the direction of the vessel toward the haven where the passengers would be. The captain of a ship of state, the captain of an industry, incurs the same kind of batrachian reproach from those who are not responsible. He must do the anxious planning. Others execute the orders that he gives. One wrong decision may spell ruin for them all.

A man may have given years and years to build a fortune. His very life-blood has perhaps been poured into the arteries of the business he has created. Then he takes the fruits of his long toil and prayerfully puts them into a new venture. The undertaking miscarries. He must begin again at the bottom. He is a power among his kind if he can turn the trick and rise again undaunted, and get back to the place from which he was dashed.

Business needs brains as well as capital. Any fool can lose money hand over fist. To decide rightly when to throw a dollar after a dollar, or a million after a million, is business genius. The leaders in business have an uncanny intuition for futurities, a second-sight enabling them to pierce the veil of the beyond. That is why the capital financial prizes go to them.

Let it not be thought that all the premiums worth having go to the kind of thinking that advances merely the commercialists. Success in life marches and rests under other standards than those of the dollar-sign. Life grows beautiful and dear by the sensitive perceptions of other values than the price-mark. Birds and flowers and water-brooks and forests have nothing to say to the man "with eyes like little dollars in the dark" who always thinks of the cash appraisal of the view. The philosopher in his garden or his quiet room knows countless satisfactions money cannot buy. As surely as the imperial mind in trade or commerce, he does his thinking for himself, in a sturdy, fine and honorable independence. He lives his life, like Brashear, of Pittsburgh, not thinking of a bank account, but considering the good he can do, and loving all breathing creatures whether they walk on four legs or on two. Such a life has its own peculiar satisfactions that are born of intellectual freedom, and therefore born of truth.—*Editorial Phila. Ledger.*

EDITORIAL NOTES

Editor: E. G. EBERLE, Bourse Building, Philadelphia, Pa.

Committee on Publication: J. W. ENGLAND, *Chairman;* G. M. BERINGER, E. FULLERTON COOK, H. B. MASON, F. J. WULLING, and the Editor-in-Chief of the Journal, General Secretary, Treasurer and Reporter on the Progress of Pharmacy, *ex-officio.*

Office of Publication, 253 Bourse Building, Philadelphia, Pa.

AGE LIMIT WILL NOT BAR HOSPITAL STEWARDS FROM THE EXAMINATIONS FOR PHARMACISTS IN THE U. S. NAVY.

That the influence of the American Pharmaceutical Association is helpful and that the high aims of this organization are recognized, was evidenced in the successful effort resulting in removing the age limit, which debarred hospital stewards, who had done service for years in these positions, from advancement. The Bureau of Navigation in the Navy Department had issued an order that no one should be eligible as pharmacist, who was over 35 years of age. Before this order went into effect hospital stewards of long service were permitted to come up for examination when vacancies occurred in the ranks of pharmacists or when there were additional appointments to be made.

In the reorganization additional pharmacists are required, and the injustice became apparent to Secretary Wm. B. Day, who directed the attention of Chairman S. L. Hilton, of the Committee on the Status of Pharmacists in the Government Service, to this situation. Mr. Hilton called at the Navy Department and was accorded a hearing by the Chief Clerk of the Bureau of Medicine and Surgery and also by the Chief of the Bureau. Mr. Hilton in speaking for the Association apprised them of the deep interest this organization had in seeing good men in service and also pointed out the injustice to those who had done faithful service as hospital stewards, by eliminating them on account of age. That such action would keep capable men from enlisting, if there was no higher position attainable.

The Chief of the Bureau expressed his pleasure because the Association was interested and took the question up with the Secretary of the Navy, and as a result an order was issued striking out the age limit.

Chairman Hilton several days thereafter called on Secretary Daniels of the Navy and extended thanks on behalf of the American Pharmaceutical Association; the secretary replied that he was glad to receive a representative of the Association and had great pleasure in correcting the injustice. During the conversation Secretary Daniels stated that in his younger days he spent several years in the drug business. He expressed himself regarding the hospital stewards, by saying that they were efficient and reflected credit on themselves and the Service.

Chairman Hilton desires that the members of the Association learn of the cordial reception given him, and also of the high regard in which the hospital stewards and pharmacists are held by the Department.

The grade of Pharmacist carries a commission; about 30 more will be added to the list, and the hospital stewards will have an opportunity to qualify by examination.

The work of the Association is not without its rewards and this recognition means more to pharmacy than simply the success provided for this limited number of pharmacists.

PROFESSOR ELIE METCHNIKOFF.

Professor Elie (Iliya) Metchnikoff's discovery that phagocytes destroy the disease germs and protect injuries against malignant bacteria, and therefore the utility of the process of inflammation, established his place as one of the world's greatest scientists. As with many other men of science, some of his investigations were not comprehended by the public, who will probably always associate his name with sour milk as prolonging life, without thinking of the investigations that have to do with the theory, just as Darwin's name is associated with the descent from monkeys and Newton's with the falling apple.

Virchow discovered the leucocytes, Pasteur the microbes and Metchnikoff supplied the missing link that brought these discoveries

together, developing the modern serum therapy.

Professor Metchnikoff was born at Livanovka, a province of Kharkof, Russia, May 15, 1845, and passed out of a useful life at Paris, July 15, 1916. He graduated at Kharkof University and also studied at Giessen and Munich, and was professor of zoology at

Photograph from Underwood and Underwood, N. Y.

PROFESSOR ELIE METCHNIKOFF.

Odessa and Petrograd. His first important discovery was made while at Messina and engaged in the investigation of the digestion of marine invertebrates. In 1888 he came to the Pasteur Institute at Paris.

Many honors were conferred on him; on his seventieth birthday he was presented with a golden book forming a unique record of the latest scientific researches, signed by the foremost modern scientists. In 1908 the Nobel Prize for medical research was divided between the late Dr. Paul Ehrlich and Prof. Metchnikoff. The $20,000 which he thus received he devoted entirely to the furtherance of his scientific researches.

SIR WILLIAM RAMSAY.

The picture herewith of Sir William Ramsay was taken from a group with Dr. Rudolph Messel and Dr. William H. Nichols while in attendance at the International Congress of Chemistry, in Washington, in 1912. Sir William also visited in this country last year; he was Lovering lecturer at Johns Hopkins University.

William Ramsay was born in Glasgow, October 2, 1853; here he also received his earlier education, and while at the university was a pupil of Lord Kelvin. He attended the University of Tübingen, receiving his degree there at the age of twenty-one. For a time he was assistant professor of chemistry in Anderson College, and thereafter for six years tutorial assistant in chemistry at the

SIR WILLIAM RAMSAY.

University of Glasgow. In 1880 he was appointed professor of chemistry in the University College, Bristol, and thereafter came to the University of London; from this position he retired in 1913, as Professor Emeritus. He died at his home in Beechcroft, Hazelmere, Bucks, England, July 23, 1916.

A record of the passing of one of the world's eminent chemists, if not the greatest, should be made in this JOURNAL, but more than a passing notice of some of his discoveries is impossible. It may, perhaps, be said that the great scientist did not accomplish much which was of direct and immediate commercial value, but future history will more than likely tell another story. He set his brilliant mind on purely scientific results, and an unusually gifted imagination contributed largely to his achievements. His work with John William Strutt (Lord Rayleigh), professor of natural philosophy, Royal Institution, on the solution of the problem concerning the differences in the density between atmospheric nitrogen and that obtained from compounds led to the discovery of argon. His most recent achievement, that of transmutation of radium into helium, upset all former theories, may prove the interrelationship of all the elements, and has opened up a new world of research into the very atoms of elements. Deserved titles and honors were freely bestowed upon him. He was an honorary member of the British Pharmaceutical Conference.

TEAR-PRODUCING GASES USED IN THE WAR SAID TO BE MANUFACTURED FROM SABADILLA.

Press reports state that some of the asphyxiating gases, and more particularly the tear-producing, are made from sabadilla, a plant of Venezuela and Mexico. The source is *Veratrum sabadilla* Retztus; the Spanish of sabadilla is *cebada*, meaning barley.

The highly poisonous seeds have long been used in medicine, and contain cavadine, or veratric acid and sabadalline; the effect is accelerating the heart beat. Sabadilla dust is a powerful, harmful irritant and laborers working with it are obliged to wear protecting masks. In Venezuela it is used by cattle raisers as an insecticide and in the manufacture of disinfectants. Its importation into Europe has been in the past for tanning fine leathers and as a mordant for dyes.

PRODUCTION OF ATROPINE POSSIBLE IN THE PHILIPPINES.

It has been ascertained that the plant *Datura alba*, which grows wild in abundance in every part of the Philippine Islands, contains a large amount of atropine. In some localities the plant reaches a height of 6 feet; it is not cultivated, and no use is made of it commercially. J. F. Boomer says in *Commercial Reports* that an American manufacturer, to whom samples were sent, ordered a large supply, and that in order to take care of any demand which may result will require that arrangements be made for collection of the plant or those parts of it that contain most of the alkaloid.

OBITUARY

DR. WILLIAM SIMON.

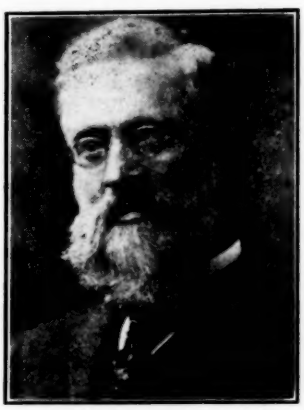
"There is a remembrance of the dead to which we turn, even from the charms of the living."

Almost any tribute that might be paid Dr. William Simon, "Professor Simon," would fail to satisfy those who knew him, who were invariably those who loved him. The same tribute would undoubtedly be considered fulsome by those who had not had the good fortune to be closely associated with this unusual man. It will be safe to state, however, that there are very few who have made and left the same helpful impression upon American pharmacy and American pharmacists during the last forty years. The opportunity for this was offered during his long service as a teacher of chemistry, as applied to pharmacy, and by the extensive use of his text-book on chemistry by students of pharmacy.

Dr. William Simon, the son of the Rev. William and Agnes Briegleb Simon, was born at Eberstadt, in the Grand Duchy of Hesse, Germany, on February 20, 1844. He attended the schools of Giessen from 1852 to 1860. In the latter year, he entered a drug store and clerked in different stores until 1866. The following year, he entered the University of Giessen to study chemistry, and took his degree of Doctor of Philosophy in 1869. He was assistant to Prof. H. Will at the university, 1869–1870, served in the Sanitary Corps during the Franco-Prussian war and came to Baltimore at the close of 1870, as chemist for the Baltimore Chrome Works, which position he retained for nearly thirty-

seven years. The first laboratory for instruction of analytical chemistry in a college of pharmacy was established by him at Baltimore in 1871. The next year, he became professor of chemistry in the Maryland College of Pharmacy and continued as such until 1902. He was also professor of chemistry in the College of Physicians and Surgeons of Baltimore from 1880 to the time of his death, and professor of chemistry in the Baltimore College of Dental Surgery from 1888 to 1916.

In 1885, he was elected a member of the American Pharmaceutical Association and, at the Old Point Comfort meeting, in 1890, he was elected chairman of the Section on Education and Legislation, presiding over that section the next year at New Orleans. He contributed several important papers on educational topics during the next few years.



DR. WILLIAM SIMON.

One of the features of the Baltimore meeting, in 1898, was his interesting and instructive lecture on liquid air.

The history of the Maryland Pharmaceutical Association shows that he took part in its organization and contributed largely to its proceedings. He was one of its incorporators and its fifth president, serving as such in 1887. Until his death, he continued his membership in the American Chemical Association and the American Association for the Advancement of Science.

Dr. Simon was married on May 13, 1873, to Paula Driver, of Baltimore, and lived at Catonsville, Maryland, for about forty-two years. They had one child, a promising boy, who died at the age of ten years of diphtheria, before the introduction of antidiphtheritic serum. Dr. Simon died at his summer home at Eagles Mere Park, Pennsylvania, on July 19, 1916. His body was cremated at Baltimore on July 21 and the ashes buried in Loudon Park Cemetery. He was the author of Simon's Manual of Chemistry, a well-known text-book used in many schools of pharmacy, medicine, and dentistry, which has passed through ten editions. Several honorary degrees had been conferred upon him, among them that of "Doctor of Medicine," by the College of Physicians and Surgeons, that of "Doctor of Science," by the University of Pennsylvania, and that of "Doctor of Laws," by the University of Maryland.

While the subject of this sketch devoted his life to the practice and teaching of chemistry, he had many avocations; one was painting, at which he did some very creditable work. Another was color photography, upon which he delivered frequent lectures; he, undoubtedly, excelled in this and his collection of color photographs is one of the finest in America. It was his delight to become familiar with the development of the sciences and was never so happy as when giving popular lectures on liquid air, Röntgen ray, *et cetera*. The strong point in these lectures was the pains he took to make interesting demonstrations.

Dr. Simon, in personality, was unique. To students, he was much more than a teacher—he was often an inspiration—a leader into the better and higher things of life. His was a great, sympathetic heart that made those who needed his help know that he was their friend and willing helper. There are scores of his students, pharmacal, dental and medical, who are proud to acknowledge their deep obligations to their dearly beloved "Professor Simon."

"Nature has a royal line and makes no mistakes in the kings she crowns."

H. and C.

NICHOLAS HENRY MARTIN.

When the picture "Signing the Indenture of a Four Years' Apprenticeship to Pharmacy," was presented in the July number, p. 768, we did not anticipate the sad duty of recording the departure of our fellow-member, Mr. N. H. Martin, in the succeeding issue of the JOURNAL. With the reproduction of the above mentioned interesting item came a note framed in Mr. Martin's usual appreciative style telling of the happy memories

he enjoyed of meeting with the members of the American Pharmaceutical Association, and which organization he joined in 1891.

The report on the event in last month's number, reproduced from the *Pharmaceutical Journal and Pharmacist* of June 3, 1916, may be considered in connection with this brief sketch of Mr. Martin's life and activity.

Nicholas Henry Martin, Ph.C., F.C.S., F.R.S.E., died July 5, at Ravenswood, Low Fell, Gateshead, England. He was born at Trebarveth, Cornwall, May 2, 1847. In 1863 he was apprenticed to John Solomon, of Penryn, Cornwall, for a term of four years. Mr. Martin passed his Minor and Major examinations December, 1868, while assistant to Henry Deane at Clapham. In 1873 he took over the pharmacy of William Ransom of Hitchin, and within less than two years became associated with Dr. H. B. Brady at Newcastle-on-Tyne; after the retirement of the latter, Mr. Martin became proprietor of the business which was subsequently converted into a private limited company as Brady & Martin, Ltd.

Mr. Martin held many important positions in British pharmaceutical organizations, among them, President of the British Pharmaceutical Conference, and when the International Congress of Applied Chemistry met in London, he presided over the Pharmaceutical Section of that body.

Mr. W. A. H. Naylor in speaking of the deceased said: "Mr. Martin did nothing by halves, and he brought to bear all the qualifications he possessed for sound and finished workmanship. He sedulously cultivated his natural gifts and used them freely for the benefit of his fellow-pharmacists." A nephew, Dr. William Martin, in a letter to Professor Remington, concludes by saying of his uncle, "He valued greatly his connection with the American Pharmaceutical Association and felt the greatest pleasure in recalling his visits to America; he spoke in the most appreciative terms of the hospitality he had enjoyed among the members and had derived great benefit from attendance of the scientific meetings. The grip of practical essentials and the hold on scientific truth reached pleasurably on a kindred soul."

Mr. Martin did excellent work for Newcastle pharmacy by resuscitating, in 1885, the educational course instituted by Brady, Proctor, and others; this was one of the events of his pharmaceutical career of which he was proud; pharmaceutical education was his outstanding characteristic and always held his interest, to it he gave much of his time and energy.

SOCIETIES AND COLLEGES

AMERICAN CHEMICAL SOCIETY TO HOLD ANNUAL MEETING IN NEW YORK.

The annual meeting of the American Chemical Society will be held in New York in conjunction with the second National Exposition of the Chemical Industries at the New Grand Central Palace. It is planned to hold a public meeting at the College of the City of New York, on either Tuesday or Wednesday of the week of meeting—September 25–30, 1916—at which topics pertaining to chemistry and national welfare will be made the subject of lectures by men of prominence in public affairs.

The various divisions of the American Chemical Society will present and discuss papers and reports in the halls of Columbia University in the forenoons, while the afternoons will be taken up with conferences.

NATIONAL ASSOCIATION OF RETAIL DRUGGISTS.

The annual convention of the National Association of Retail Druggists will be held in Indianapolis, September 18–22. It is needless to remark on the coöperative work of this association with that of the American Pharmaceutical Association, in fact, there are many who hold membership in both organizations, and what is more and better, usually the enthusiasts of one are also deeply interested in the work of the other. While the N. A. R. D. Journal and the officials give publicity to the event, we make the announcement for record in these pages. The convention city is making preparations for the coming meeting, and the experience of the American Pharmaceutical Association is that a spirit of cordiality abounds in Indianapolis.

THE NATIONAL WHOLESALE DRUGGISTS' ASSOCIATION.

The Baltimore Entertainment Committee of the National Wholesale Druggists' Association Convention, which will be held the first week in October, has planned an interesting automobile trip through Baltimore's beautiful suburbs, a visit to the Baltimore Country Club for luncheon, then a boat trip down the Patapsco River and out into the Chesapeake Bay with a stopover at Annapolis. A real Maryland oyster roast on the Maryland sho', where selected, succulent Chesapeake bivalves will be served in five styles—roasted, fried, raw, fritters and stewed—with all the necessary trimmings, and a real Maryland darky band, which will make guests keep time to the music. Then there is to be a card party and a dance one night on the Emerson roof, and a private vaudeville another night, and a grand banquet at the Belvidere, where everyone will forget there is such a thing as trouble in the world.

STATE ASSOCIATION MEETINGS.

ALABAMA.

The thirty-fifth annual meeting of the Alabama Pharmaceutical Association was held at Gadsden, June 21–22.

President Scarborough spoke of the conditions in pharmacy and recommended the appointment of a committee on publicity to distribute information among the members; he endorsed the Stephens Bill and urged support of the American Pharmaceutical Association. Dr. James of the federal revenue department explained the exactions of the Harrison Law. A member remarked that he was unaware of the requirement that a narcotic prescription must be dated until it cost him a $25.00 fine for overlooking this.

In an address by S. A. Williams on sidelines the speaker contended that the profits of the drug business depended on such sales, that the prescription department was essential to the drug business but did not bring profit. A. P. Rogers in discussing prescription prices said that the charges must be advanced if any profits were to be expected. This in a measure, it was contended, is due to the advanced prices of drugs, but even prior to the rise, prescriptions were compounded without adequate charges.

Officers for the ensuing year were elected as follows: President, W. S. Vance, of Gadsden; vice-presidents, W. N. Varnon, of Selma, and C. R. Walker, of Ensley; treasurer, S. L. Toomer, of Auburn; secretary, W. E. Bingham, of Tuscaloosa.

Tuscaloosa was selected as the place for the next annual meeting, which is to be held the third Wednesday in June, 1917.

CALIFORNIA.

The annual meeting of the California Pharmaceutical Association was held in Los Angeles, June 14–15.

The keynote in President Rees' address was Organization and Coöperation. He spoke for harmony between the Association and the Board of Pharmacy which had at times not been as friendly as should be the case. He spoke in favor of the Stephens-Ashurst Bill, affiliation with the National Association of Retail Druggists and the support of that organization was advocated.

Quite a number of very interesting papers were read, among them one by Chas B. Whilden, in which he spoke for larger manufacturing by retail druggists and advertising their own goods by window display, and other means of publicity used by manufacturers.

Revision of the United States trade mark laws came up for consideration, and the work of the American Pharmaceutical Association in this connection encouraged.

Carl E. Rosenberg read a paper on salesmanship, in which thorough business organization, service and loyalty were pronounced as potent factors.

The commercial value of a drug store laboratory was made the subject of an excellent paper by Carl Dyna, of Patten.

The officers elected for the ensuing year are: President, E. G. Binz; first vice-president, W. Bruce Philip; second vice-president, Frank A. Gardner; secretary, E. A. Henderson; treasurer, L. L. Broodeen; executive committee, R. W. Monkman, chairman; L. Harris, K. B. Bowerman, J. P. Koehler, J. A. Sanford, George Smith.

COLORADO.

The Colorado Pharmaceutical Association held its twenty-seventh annual meeting at Estes Park.

Legislative matters received considerable attention and measures were proposed defining the status of alcohol so that it may be

legally purchased and used in the manufacture of non-potable preparations. A proposition to amend the pharmacy law to provide the Board of Pharmacy with a secretary who should not be a member thereof; and also to provide an amendment forbidding the use of "drug store" or "pharmacy" signs to any but authorized persons. It was also recommended that reciprocal registration be put into effect by the Board of Pharmacy if permissible under the present law; if not, then the law should be so amended as to permit of such registration.

The following officers were elected: President, Fred C. Heverly, Longmont; first vice-president, Thos. C. Coltman, La Junta; second vice-president, C. Van Zandt, Denver; treasurer, C. D. Smith, Grand Junction; secretary, Chas. J. Clayton, Denver; historian, D. C. Taylor, Pueblo. As delegates to the American Pharmaceutical Association, E. G. Fine and H. B. SeCheverell were named; and L. Wilson was nominated representative to the National Association of Retail Druggists.

CONNECTICUT.

The fortieth annual meeting of the Connecticut Pharmaceutical Association was held at the Shoreham Hotel, Morris Cove, New Haven. The following officers were elected for the ensuing year: M. Frank Hope, of New Haven, president; Carl S. Ramsay, New Britain, first vice-president; Edward Nolan, Torrington, second vice-president; P. J. Garvin was re-elected secretary-treasurer.

FLORIDA.

The Florida Pharmaceutical Association met at Hotel DeSoto this year.

President M. W. Taylor in his address spoke of the strides that had been made in the drug business in Florida and expressed satisfaction in the largely increased membership of the Association.

The Florida Pharmaceutical Association divides the work of the annual meetings, by assigning papers on pharmacy to a Scientific Section, while those dealing with business subjects are discussed in the Commercial Section. There were a large number of papers read in both of these sections; those in the former were in charge of W. D. Jones, while the latter were arranged for by P. F. Bloodworth.

The newly elected officers are: H. H. D'Alemberte, Pensacola, president; J. S. Jewitt, Lakeland, first vice-president; W. M. Perry, Miami, second vice-president; A. L. Wise, Jasper, third vice-president; J. H. Haughton, Palatka, secretary and treasurer. Executive committee: D. W. Ramsaur, of Palatka, M. M. Taylor, of Tampa, and W. D Jones, of Jacksonville.

IDAHO.

The Idaho Pharmaceutical Association convened in the annual session at Guyer Inn, June 19–21. This selection of place seemed to be so satisfactory to the members that the 1917 convention will be held here.

President Bee in his address spoke of the unsatisfactory condition of the drug market without a parallel in the history of the drug trade. Instead of drafting a new pharmacy law, he recommended that the present one be amended. He favored the contemplated National Price Maintenance Measure.

Secretary Whitehead reported that the Association now had 128 active members. The reorganization plan was adopted by the Association in line with that of the Utah Association.

Mr. John Culley, of Ogden was present, and explained their method of organization wherein representatives of the Association were appointed in various districts.

Quite a number of papers were read and discussed.

The officers elected for the ensuing year are: President, George J. Bailey, Pocatello; first vice-president, E. E. Colpin, Oakley; second vice-president, L. L. Daus, Weiser; secretary, William F. Bee, Boise; treasurer, L. A. Harmon, Caldwell. Executive Committee: first district, E. L. Prebsting, Wallace; second district, J. T. Ray, Lewiston; third district, Tom Poole, Nampa; fourth district, C. K. McCrum, Boise; fifth district, Mark Aukema, Hailey; sixth district, Frank Murray, Twin Falls; seventh district, S. S. Ferguson, Pocatello; eighth district, W. E. Ricks; ninth district, Hugo J. Enenbach, Driggs.

INDIANA.

The Indiana Pharmaceutical Association met in Indianapolis. Dr. H. E. Barnard, state food and drug commissioner, delivered an address in which he spoke of the activities of his department, complimenting the druggists by saying that they had lightened the

work of the commission by complying with the laws and regulations. That there were fewer illegal drugs on the shelves of the drug stores to-day than ever before. He said that out of 246 drug samples analyzed at the State laboratory in the last year, only five were listed as being illegal. He also pointed out that by coöperation, the manufacturers, the retailers and the food and drugs department had driven out the extravagant advertisements and promises of cures that formerly featured many nostrums sold in the market. This concerted attack on worthless or harmless nostrums, he asserted, was one of the important developments of recent years.

Several other addresses were delivered and quite a number of papers were read. The following officers were elected: President, M. A. Stout, Bluffton; vice-presidents, W. H. Rudder, Salem, R. A. B. White, South Bend, and Wood Wiles, Bloomington; secretary, William F. Warner, Indianapolis; treasurer, Frank H. Carter, Indianapolis. Ernest Stahlhuth, Columbus, M. A. Stout, of Bluffton, and E. W. Stucky, were chosen members of the executive committee.

MAINE.

A history of the Maine Pharmaceutical Association was contributed by A. G. Schlotterbeck, of Portland, to the American Pharmaceutical Association and printed in the JOURNAL for March, 1914. This year the Annual Convention was held in Augusta and was the 49th annual meeting of this Association which holds the record and priority of State Pharmaceutical Associations.

The meeting was largely attended and an interesting program was carried out. Professor Theodore J. Bradley, of Boston, was a visitor during the convention, and delivered an address. Professor D. T. Dougherty, of Bath, in his address, spoke of market conditions, and dwelt upon the need for coöperation in all things that pertain to pharmacy. With regard to legislation, he advised that no measure before the Legislature of Maine should be encouraged by druggists unless the same had been submitted to the Legislative Committee of the Association. He also declared that the stock of drugs and preparations carried by physicians in their offices who dispense them, should come under the supervision of the drug inspector. He favored the Stephens Bill, and advised that the members should keep in touch with National Legislation.

Reports of Dr. M. L. Porter, Secretary, and A. W. Meserve showed that the present membership was 338 and the financial status of the Association good.

The following officers were elected: President, F. W. Buckman, of Skowhegan; first vice-president, H. C. Buxton, of Fort Fairfield; second vice-president, F. H. Neal, of Fairfield; third vice-president, E. F. Carswell, of Gorham; treasurer, A. W. Meserve, of Kennebunk; secretary, M. L. Porter, of Danforth.

The following were elected delegates to attend the meeting of the American Pharmaceutical Association in September, at Atlantic City, N. J.: Dr. M. L. Porter, of Danforth, secretary; D. T. Dougherty, of Bath, the retiring president; and F. W. Buckman, of Skowhegan, the newly elected president.

It was voted to recommend to the Governor the following men as candidates for commissioner of pharmacy: J. A. Broe, of Portland, George O. Tuttle, of Portland, E. F. Carswell, of Gorham, C. H. Beane, of Gardiner, A. W. Meserve, of Kennebunk and O. W. Jones, of Auburn.

MARYLAND.

A large attendance was present at the annual convention of Maryland Pharmaceutical Association at Braddock Heights.

President Bunting reviewed the work of the Association and spoke of the legislative activities in Maryland. It was reported that there was more or less inattention paid to proper registration of poisons by other dealers than druggists. The work of the Procter Memorial Committee of the American Pharmaceutical Association was endorsed. Chairman John F. Hancock was unable to be present for the first time in many years and was missed from the convention.

The following officers were elected: President, J. D. Stotlemeyer, Hancock; first vice-president, Eugene W. Hodson, Baltimore; second vice-presidents, C. K. Stotlemeyer, Hancock; secretary, E. F. Kelly, of the Department of Pharmacy, University of Maryland, who has held the same position for a number of years; treasurer, Samuel Y. Harris, Baltimore. New members of the

executive committee: A. L. Pearre, Frederick; Charles L. Meyer, Baltimore, and George A. Bunting, Baltimore, and W. H. Clark, Pocomoke City.

MASSACHUSETTS.

The Massachusetts State Pharmaceutical Association convened at Swampscott, June 20 to 22. The Stephens Bill received hearty endorsement and some of the Massachusetts Congressmen were charged with being indifferent regarding this important measure. An appropriation was made for continuing the work of the Legislative Committee.

The scholarship in the Massachusetts College of Pharmacy was continued and the Association reaffiliated with the National Association of Retail Druggists.

J. M. Keliher, of New Bedford; L. C. Ellis, of Lynn; and W. H. Glover, of Lawrence, were recommended for appointment on the State Board of Pharmacy. Prof. Elie H. LaPierre was endorsed for appointment to the State Board of Trade, and Paul C. Klein, of Boston for appointment to the State Board of Health.

The following officers were elected: President, E. O. Engstrom, of Pittsfield; vice-presidents, W. S. Doane, of Worcester; C. J. Thompson, of Springfield, and C. C. Hearn, of Quincy; secretary, J. F. Guerin, of Worcester; treasurer, J. F. Finneran, of Boston; trustees of permanent fund, W. F. Sawyer, of Boston; F. E. Mole, of Adams, and J. W. Cooper, of Plymouth.

The Traveling Men's Association elected the following officers: President, J. H. Johnson, of Boston; vice-presidents, A. W. Jackson, of Boston, and W. H. Henderson, of Malden; secretary-treasurer, Albert Whitaker, of Chelsea; members of the executive committee, R. R. Patch, of Boston, and E. S. Rae, of Charlestown.

NEW HAMPSHIRE.

The forty-third annual meeting of the New Hampshire Pharmaceutical Association was opened at the Hotel Wentworth, Portsmouth, June 27.

In the afternoon a business meeting was held with an address by President Porter, followed by readings of the reports of the officers and committees and the admission of new members. At 8 o'clock in the evening a card party was held and a vaudeville entertainment put on by the Traveling Men's Auxiliary.

The convention concluded Wednesday evening with a ball. The officers elected for the ensuing year are as follows: President, S. S. Lightbody, Rochester; first vice-president, W. H. Brown, Pittsfield; second vice-president, W. G. McCullins, Bristol; secretary, Eugene Sullivan; treasurer, S. H. Bell, Derry; auditor, J. H. Marshall, Manchester.

Members of the Executive Committee: Goodwin E. Philbrick, Portsmouth; P. H. Boire, Manchester; Eugene Sullivan, Concord.

NORTH CAROLINA.

The thirty-seventh annual convention of the North Carolina Pharmaceutical Association was held at Wrightsville Beach. There was a large attendance and fifty new members were added.

President E. L. Tarkenton in his annual address recommended the Association to go on record as encouraging the growing of medicinal drug plants, and that the membership be strengthened by sending out a delegate over the State three times a year to solicit members and collect dues. He advocated a law which would prohibit the dispensing of drugs by any but registered pharmacists and particularly censured dispensing doctors. He was also severe in discountenancing fountain luncheonettes, counter prescribing, substitution, druggists' names appearing in patent medicine advertisements, and the filling of prescriptions by unregistered clerks. He recommended that drug stores be kept open certain hours on Sunday for filling prescriptions and the sale of medicine, but not for selling drinks, tobacco, etc. Ownership of drug stores should be restricted to certified pharmacists; the pharmacy law should be rigidly enforced; certificates should not be given to clerks who had only soda fountain experience; closer relationship should exist between the Association and pharmacists of the State and the University School of Pharmacy. The Carolina Journal of Pharmacy should be made the official organ of the Association and druggists should faithfully follow out the provisions of the Harrison narcotic law. The readoption of last year's resolution indorsing the Stevens bill was also urged.

Prof. Henry P. Hynson, of Baltimore, was present as a guest of the Association, and delivered an address largely devoted to advertising, not altogether in the papers but

by conduct in and about the store. He also conducted a "prescription clinic," and later, was elected an honorary member of the Association. Quite a number of interesting papers were read.

The following officers were elected: President, E. G. Birdsong, Raleigh; first vice-president, G. A. Matton, High Point; second vice-president, S. E. Welfare, Winston-Salem; third vice-president, G. R. Pilkington, Pittsboro; secretary, J. G. Beard (re-elected), Chapel Hill; treasurer (re-elected), Charlotte; member of the board of pharmacy, E. V. Zoeller (re-elected), Tarboro; local secretary, C. A. Raysor, Asheville.

The next annual meeting will be held in June, 1917, at Asheville.

OHIO.

The thirty-eighth annual meeting of the Ohio Pharmaceutical Association was held at Cedar Point, July 11–13.

President J. F. Gallagher presented a studied address in which he brought out legislative necessities, the value of wider publicity and correct information anent the drug business for the public. Concurring in the views of the president the Association adopted the following declaration: "We ask that each druggist support for election or re-election legislators who will be, or have been, of aid to us. Too much attention cannot be given to this form of politics." A session during the meeting of the State Legislature will be called.

There was considerable discussion of the draft of a model pharmacy law, presented by F. H. Freericks, Esq., of Cincinnati, who has been getting suggestions for a draft, as a representative of the American Pharmaceutical Association.

Secretary T. H. Potts presented an enlightening résumé of the national legislative situation. Governor Willis of Ohio was a visitor and briefly addressed the Association. Professor Kauffman was presented with a handsome chimes clock.

The Association elected the following officers: President, E. R. Selzer, of Cleveland; vice-presidents, G. B. Topping, of Columbus, and J. W. Dysle, of Marietta; secretary, T. D. Wetterstroem, of Cincinnati (re-elected); treasurer, L. W. Funk, of Columbus (re-elected); and member of the council for five years, J. F. Gallaher, of Dayton.

Otto Katz, of Cincinnati, and C. W. Hildebolt, of Germantown, were selected as delegates to represent the Association at the Indianapolis meeting of the National Association of Retail Druggists. As its delegates to the Atlantic City meeting of the American Pharmaceutical Association, the Association selected E. H. Thiesing, of Cincinnati; W. M. Bowman, of Toledo, and Dr. W. C. Alpers, of Cleveland.

OREGON.

The twenty-seventh annual meeting of Oregon Pharmaceutical Association was held at Seaside, July 11–14.

President F. A. Nichols in his address spoke for coöperation and friendship among druggists; the interests of the Association were those of the individual member. He advocated more interest in legislative matters, and was deeply concerned in preventing liquor selling in the drug store. He favored a price maintenance measure. The president's recommendations were adopted. The subject of closing drug stores on Sunday came up for considerable discussion, and the decision reached was that a necessity existed for drug stores keeping open on Sunday.

The officers elected for the ensuing year are: President, D. J. Fry, of Salem; vice-presidents, W. H. McNair, of Ashland, and H. F. Brandon, of Portland; secretary, A. W. Allen, of Portland, and treasurer, B. F. Jones, of Portland.

TENNESSEE.

The thirty-first annual meeting of the Tennessee Pharmaceutical Association was held at Monteagle, July 11–13.

Reference to the meeting has been made under the reports of Local Branches. Delegates were appointed to attend the meeting of the American Pharmaceutical Association and of the National Association of Retail Druggists.

The following officers were elected: President, D. J. Kuhn, of Nashville; vice-presidents, Harry Mayer, of Memphis, John J. Ingle, of South Pittsburgh, and H. E. Mason, of Smithville; secretary, T. J. Shannon, of Sharon, and treasurer, B. J. Sand, of Nashville.

It was decided that the meeting next year should be held at Memphis in conjunction with the State Associations of Arkansas and Mississippi.

UTAH.

The sixteenth annual convention of the Utah Pharmaceutical Association was held at Logan.

A number of addresses were delivered dealing with good business management and salesmanship. G. Coulson Smith, investigating agent of the state board of pharmacy, and the state medical examiners, read an interesting paper on the peyote curse among the Indians of eastern Utah, detailing the effects of the narcotic and the demoralization it causes, and as a result the Association will prepare a bill placing peyote in the list of forbidden and habit-forming drugs.

The election of officers resulted as follows: President, Walter H. Dayton, Salt Lake; first vice-president, H. H. Peterson, Richfield; second vice-president, J. L. Boyden, Coalville; secretary, Frank Folland, Salt Lake; treasurer, William Swinyard, Logan; directors, John Culley, Ogden; A. L. Eddy, Brigham City; R. S. McAllister, Logan; Edward Johnson, Mt. Pleasant; A. H. Stevens, Provo; A. Bevan, Tooele.

The next meeting of the Association will be held in Salt Lake City.

VERMONT.

The twenty-third annual meeting of the Vermont Pharmaceutical Association was held at St. Albans, June 27.

President F. R. Barker in his address reviewed the condition of the drug business, and in an interesting way gave a history of its progress from the staid condition of the past to the more commercial methods of the present. He spoke for loyalty and service in the Association. The Association now has a membership of 300.

The following officers were elected: President, D. G. Quebes, of Rutland; vice-president, O. B. Wells, of Burlington; secretary, and treasurer, Percy F. Bearse, of Brandon.

VIRGINIA.

The thirty-fifth annual meeting of Virginia Pharmaceutical Association was held at Staunton, July 11–13.

The effects of the Virginia prohibition laws on the drug business received consideration, resulting in the appointment of a committee to confer with Commissioner Sidney J. Peters regarding the matter, so druggists may have a thorough understanding as to how the law applies to the retail druggist.

Secretary T. A. Miller resigned from the Board of Pharmacy some time ago, and the names of J. W. Williamson, T. Ramsey Taylor, W. T. Reeves, G. M. Farrar and H. S. Eley are to be submitted to the Governor, from which number he will appoint one as member of the Board.

It was decided to begin the publication of a journal devoted to the welfare of the Association, and the following editors-in-chief were appointed: A. Bolenbaugh, E. L. Brandis and W. F. Rudd, to be assisted by a number of associate editors. The name of the journal will be the *Virginia Pharmacist.*

The following officers were elected for the ensuing year: President, T. Ramsey Taylor, of Norfolk; vice-presidents, C. H. Goldsboro, of Culpeper, and G. E. Thomson, of Chatham; secretary, E. L. Brandis, of Richmond; treasurer, H. S. Eley, of Suffolk; and local secretary, J. Y. McRae, of Norfolk.

The meeting next year is to be held at Old Point Comfort.

WASHINGTON.

A striking feature of the twenty-seventh annual meeting of the Washington State Pharmaceutical Association was the meeting place, namely on board the steamship *Governor* on a tour of Puget Sound, and while this may indicate amusement rather than work, the proceedings prove otherwise. The convention dates were June 19–22.

President C. W. Johnson in his address deplored the fact that large quantities of liquor were sold in drug stores on account of the Prohibition Law, and he sought to have the Association provide legislation which would exclude such sales, with the exception of alcohol. The Association went on record with the resolution requesting the officials to strictly enforce the present law. On vote it was decided, however, to secure the opinion of all the members on this subject. President Johnson further asked for a resolution calling upon the Secretary of State to endeavor to negotiate an agreement between the belligerent nations to allow the passage through the blockade of medicinal chemicals, and this met with the favor of the Association. He endorsed the work of pharmaceutical teaching in high schools, but simply as a stepping-stone to further pharmaceutical education. Dr. Johnson commented on the successful

work of the Association and spoke of hearty coöperation with the American Pharmaceutical Association and the National Association of Retail Druggists.

Secretary Garrison of the State Board of Pharmacy presented the annual report which evidenced great activity and very satisfactory conditions.

Secretary A. W. Linton of the Association reported on the financial status and membership of that body, showing that there were nearly 200 members and the treasury in a satisfactory condition.

In the discussion of the president's address, which was referred to a committee, it was brought out from the records of King County that 42,601 gallons of whiskey were bought under druggists' permits since the Prohibition Law became effective. This does not include other liquors.

Secretary Garrison pointed out that if the courses in pharmacy in high schools would permit the candidates to come before the Board for assistant pharmacists' examination, they would thereafter be entitled to take the examination for full registration.

A large number of interesting papers were presented. One by Wm. Maske, Jr., on "Ointments Prepared by the Use of Volatile Solvents," showed that ointments of that character wherein chemicals were incorporated by a solution, the substance in the ointment crystallized out, and this makes such methods objectionable.

There were a number of papers on drug plant cultivation, and a history of Washington State Pharmaceutical Association was presented by W. P. Bonney, of Tacoma. A display of drug plants and an herbarium collection were on exhibition. Many of these drug plants were from the botanical garden of the College of Pharmacy, University of Washington.

The following names were presented for vacancies that might occur on the State Board of Pharmacy: H. G. Duerfeldt, Spokane; George D. Prigmore, Chehalis; Dr. C. W. Johnson, Seattle; Mrs. Emily McRae, Spokane; V. T. McCroskey, Colfax.

The following officers were elected: President, Dr. C. W. Johnson, Seattle; first vice-president, Henry G. Duerfeldt, Spokane; second vice-president, W. S. Kinsel, Seattle; secretary, A. W. Linton, Seattle; treasurer, F. D. Marr, Tacoma; executive committee, D. B. Garrison, Connell, Wash.; M. A. Weed, Seattle; W. S. Kinsel, Seattle; Cornelius Osseward, Seattle; Henry G. Duerfeldt, Spokane; G. C. Norton, Tacoma; J. Lough, Seattle; L. F. Swift, Seattle; G. R. Fetterman, Bremerton.

The proceedings of this Association were printed and sent out to the members very soon after the meeting.

WEST VIRGINIA.

The tenth annual meeting of West Virginia Pharmaceutical Association was held at Deer Park, Md.

President B. E. Downs in his address favored the restriction of drug sales to druggists and the exclusion of the peddler. He spoke against counter prescribing and praised the Committee on Education for their work in behalf of the pharmacy department of the State University.

The finances of the Association were reported in good shape. Quite a number of papers were read. Dr. J. H. Beal was present as guest of the Association and delivered an address on "The Necessity of Organization."

The following officers were elected: President, C. A. Neptune, of Parkersburg; vice-presidents, Stephen Tierne, Weston; J. Charles Hall, Charleston; B. J. Farrell, Clarksburg; treasurer, Chatham Sinclair, Wheeling; secretary, C. H. Rogers, Morgantown; member executive council, Gay Dent, Morgantown.

Deer Park, Md., was selected for the next meeting place.

WISCONSIN.

The thirty-eighth annual convention of the Wisconsin Pharmaceutical Association was held in Wausau, July 18–21.

President Kremer, in his address, told of the work of the Association and made several recommendations. He highly commended the Stephens Price Maintenance Bill and the work of the State Dairy and Food Commission. Mr. Kremer recommended stricter educational tests for Wisconsin.

George J. Weigle, state dairy and food inspector, told what his department has accomplished relative to correct weights and measures. He further said that druggists should be under state control and licensed. The profession would then be standardized and the undesirable druggists who violate laws could be put out of business.

The Association decided to petition the Board of Regents of the University of Wisconsin to make the School of Pharmacy a separate institution with its own professors.

The officers elected are: President, J. J. Possehl, Milwaukee; first vice-president, Bert Schwanberg, Wausau; second vice-president, F. W. Mueller, Oshkosh; third vice-president, A. C. Otto, Grand Rapids; secretary, E. C. Raeuber, Milwaukee; treasurer, L. G. J. Mack, Milwaukee.

The names of H. G. Ruenzel, Milwaukee; F. Wieckman, Wausau, and George H. Kesten, Milwaukee, were recommended to Gov. E. L. Philipp for selection to the Board of Pharmacy when the next vacancy occurs.

The next annual meeting will be held in Milwaukee.

THE PHARMACIST AND THE LAW

AMERICAN LAW CRAZE.

Edward Trefz, field secretary for the Chamber of Commerce of the United States, recently said that "during the last ten years the British Parliament had passed only 1500 laws. During the last five years Congress and State Legislatures have passed 62,550 laws, forgetful that God has made a very fair success out of this universe with only ten laws."

REVENUE BILL PASSES THE HOUSE BUT STILL UNDER CONSIDERATION BY THE SENATE.

The Administration's Revenue Bill passed the House July 10, but so many amendments have been suggested in the Senate, that at this writing a vote has not been taken. The measure eliminates the stamp taxes.

PROTECTION FOR COAL-TAR MEDICINALS FAVORED BY SENATE SUB-COMMITTEE.

The Sub-committee on Finance of the Senate seems to favor that medicinal products made from coal tar should receive the same consideration in the matter of protection under the new revenue bill as the aniline dyestuffs industry, also depending upon coal tar. The sub-committee let it be understood that they considered both industries equally on a parity in their claims for protection.

PUBLIC WARNED AGAINST FRAUDULENT INFANTILE PARALYSIS CURES.

Officials charged with the enforcement of the Food and Drugs Act have warned the public that any preparation offered for sale as a treatment for infantile paralysis should be looked upon with extreme suspicion. Inspectors, accordingly, have been instructed to regard as suspicious, and to collect samples of all medicines in interstate commerce for which such claims are made. Makers of such fraudulent remedies will be vigorously prosecuted whenever the evidence warrants action under the Sherley amendment to the Food and Drugs Act. So-called remedies for infantile paralysis which are offered for import into the country will be denied entry.

THE STEPHENS BILL SITUATION.

It is clearly evident that consideration of the uniform price maintenance measures will go over until Congress reconvenes this fall. This seems also to be the opinion of the American Fair Trade League at this time.

SYNTHETIC SUBSTITUTES UNDER THE HARRISON LAW.

Under a ruling of the Treasury Department that any synthetic substitute for cocaine was taxable under the Harrison act, the Farbwerke-Hoechst Company paid, under protest, to the Collector of Internal Revenue, the tax required by the act and then brought an action for recovery to demonstrate that novocain, holocain, orthoform and anæsthesin were not derivatives of coca leaves or opium, and that they contained no cocaine and no habit-forming drugs.

The case was tried for two days before Judge Grubb and a jury, during which the Farbwerke-Hoechst Company called notable chemists, surgeons, dentists and pharmacologists, who testified to the chemistry and non-habit-forming qualities of novocain.

There was no contradiction of the medical, chemical or dental testimony as to the non-habit-forming qualities of novocain and as to its chemical dissimilarity from opium, coca leaves and their derivatives.

The court took the case from the jury and ordered a verdict for the Farbwerke-Hoechst Company, on the ground that the text of the law did not include synthetic substitutes except in Section IV, where it was without force so far as the general construction of the law is concerned.

CALIFORNIA BOARD OF PHARMACY ACTIVE IN EFFORT TO CONTROL NARCOTIC SALES.

In a number of letters to officials of the Government the California Board of Pharmacy has pointed out that sales were being made by smuggling, and on physicians' orders without respect for the law. For example, prescribing several ounces of morphine for one person and the writing of 156 prescriptions for narcotics by one physician during a short period of time.

The Board recommends the removal of Harrison Law privileges from those who follow such practices, and with regard to limitations of amounts to be prescribed they make these recommendations: First: Those who are habitual users, limit the amount of morphine to five grains, cocaine two grains, heroin, two grains, that the physician may prescribe daily during the treatment, specify the length of time it should last and at the end of thirty days of such treatment must show a complete cure, otherwise the treatment will not be considered in good faith.

Second: Those persons afflicted with an incurable disease: The physician should not be restricted to the amount prescribed but should be required to state the nature of the disease or ailment upon the prescription and make a report to the Federal or State Departments having jurisdiction. These should be subject to thorough investigation.

WAR DEPARTMENT

List of changes of stations during July, 1916, in the cases of Sergeants First Class and Sergeants, Medical Department.

SERGEANTS FIRST CLASS.

John E. Oberg, from Ft. Worden, to the Southern Department for assignment.

SERGEANTS.

The following named sergeants were sent to the Southern Department for assignment to station:

Leo J. Miller, from Ft. Leavenworth.

Fritz J. Sheffler, from Army Medical School, Washington, D. C.

Patrick F. O'Donnell, from Ft. Mott.

David Perkins, from Ft. Michie.

Carl H. Hoffmeyer, from the U. S. Disciplinary Barracks, Leavenworth.

James W. Wilkie, from West Point, N. Y.

Richard H. Bledsoe, from the U. S. Disciplinary Barracks, Alcatraz, Cal.

Wm. D. Cherry, from the U. S. Disciplinary Barracks, Alcatraz, Cal.

William M. Anderson, from the U. S. Disciplinary Barracks, Alcatraz, Cal.

John W. Keenan, from Ft. Adams.

Jacob O. Christman, from the Army General Hospital, Ft. Bayard.

Frank Pospishil, from the Army General Hospital, Ft. Bayard.

Andrew E. Hartwell, from Plattsburg Barracks, N. Y.

Luther Brazier, from Ft. Monroe.

Frederick C. Miller, from Ft. Caswell.

Wm. E. Fletcher, from the Letterman General Hospital, Cal.

John M. Toppins, from the Letterman General Hospital, Cal.

Carl M. Shatzer, from the Letterman General Hospital, Cal.

Burt Youngs, from the Letterman General Hospital, Cal.

Burton L. Williams, from the Letterman General Hospital, Cal.

Ernest Arias, from the Letterman General Hospital, Cal.

John R. Flynn, from the Letterman General Hospital, Cal.

Ralph P. Dolby, from Ft. Worden.

John R. Lommell, from Ft. Lawton.

Wm. C. Below, from Ft. George Wright.

UNITED STATES PUBLIC HEALTH SERVICE.

Pharmacist John H. Hayes. Relieved at Marine Hospital, Wilmington, N. C., and proceed to New York for duty in connection with the studies of poliomyelitis.

July 15, 1916.

CHANGES OF ADDRESS

All changes of address of members should be sent to the General Secretary promptly.

The Association will not be responsible for non-delivery of the Annual Volume or Year Book, or of the JOURNAL unless notice of change of address is received before shipment or mailing.

Both the old and the new address should be given thus:

HENRY MILTON,
From 2342 Albion Place, St. Louis, Mo.
To 278 Dartmouth St., Boston, Mass.

Titles or degrees to be used in publications or in the official records should be given, and names should be *plainly* written, or typewritten.

CHANGE OF ADDRESS SINCE JUNE 18, 1916.

BRACONIER, F. G.,
From 32 Churchill Ave., Campello, Mass.
To 1145 Main St., Campello, Mass.

JENSEN, C. A. B.,
From 333 S. Montana St., Butte, Mont.
To Residence unknown.

ROGOFF, J. M.,
From Medical Dept., Vanderbilt University, Nashville, Tenn.
To Residence unknown.

POWELL, M.,
From Klemme, Iowa.
To Residence unknown.

MAHONEY, W. A.,
From Cocoa, Fla.
To No. 3 Lauderdale Apt., Jacksonville, Fla.

SCHULZ, EMIEL,
From Regt. Hosp., 6th Cavalry, Columbus, N. Mex.
To Regt. Hosp., 6th Cavalry, Marfa, Texas.

STUART, H. A.,
From 3321 Third Ave., South Minneapolis, Minn.
To 126 E. Lake St., Minneapolis, Minn.

BUEHLER, C. T.,
From Residence unknown.
To Cole Camp, Mo.

MILLER, C. E.,
From Navy Yard Dispensary, Norfolk, Va.
To Albion, Indiana.

SEIDMAN, HARRY,
From 627 N. 2nd St., Philadelphia, Pa.
To S. E. Cor. Franklin and Columbia Aves., Philadelphia, Pa.

BLOME, W. H.,
From 426 Baldwin Ave., Detroit, Mich.
To 4 N. Baldwin Ave., Detroit, Mich.

BRIGGS, A. E.,
From 301 Clements St., San Francisco, Cal.

GOODRICH, J.,
From 6307 Brooklyn Ave., Seattle, Wash.
To 203 Bagley Hall, University of Washington, Seattle, Wash.

TRIMBACH, A. R.,
From 23 Aberdeen St., Suite 2, Boston, Mass.
To 158 Horton St., Lewiston, Me.

HOLTHOEFER, H. J.,
From 5030 Prairie Ave., Chicago, Ill.
To 3300 State St., Chicago, Ill.

BOOK NOTICES

The Pharmacopœia of the United States of America. Ninth Decennial Revision. By authority of the United States Pharmacopœial Convention held at Washington, D. C., May 10, 1916. Prepared by the Committee of Revision and published by the Board of Trustees. Official from September 1, 1916. 8vo., 728 pages, Philadelphia, Agents, P. Blakiston's Son & Co.

Elsewhere a review and editorial mention will be found of the United States Pharmacopœia, Ninth Revision, so it is not necessary here to go into a review of this authority. Aside from the improvements which have been made in the text and the new chapters which have been added, the excellent mechanical work is deserving of commendation. The printing was done by J. B. Lippincott Company, of Philadelphia.

Copies of the Pharmacopœia will be obtainable by the time this JOURNAL reaches the readers.

The prices fixed for the Pharmacopœia are: Bound in cloth, $3; buckram, $3.25; sheep,

$3.50, and flexible leather, interleaved, $4.50. Pharmacists will likely make their purchase through wholesale druggists.

The National Formulary. Fourth Edition. By authority of the American Pharmaceutical Association. Prepared by the Committee on National Formulary of the A. Ph. A. Official from September 1, 1916. 8vo., 394 pages. Published by the American Pharmaceutical Association.

The remarks made relative to extended reference in these columns of the U.S.P. IX applies also to the National Formulary, Fourth Edition.

The improvements made in this revision are so decided that they will attract the favorable attention of all who make use of this valuable Formulary, which now is far more than that, as it lays down standards and provides the pharmacist with tests and much useful information.

The mechanical part of the work has been done with great care, the typography is particularly clear and readable. J. B. Lippincott Company are the printers and binders; the Midland Publishing Company, Columbus, Ohio, has been appointed general sales agent with the following sub-agents: The Baker-Taylor Company, New York City; The Chicago Medical Book Company, Chicago; L. S. Mathews Company, St. Louis, Mo.; The Pacific Drug Review, San Francisco and Portland. Wholesale druggists will supply the book.

The prices of the National Formulary in the various bindings are as follows: Muslin, plain, $2.50; Buckram, plain, $2.75; Buckram, interleaved, $4.00. They are now on sale.

Poisons and Habit-Forming Drugs. A digest of laws and regulations relating to the possession, use, sale, and manufacture of poisons and habit-forming drugs, enacted during 1914 and 1915, now in force in the United States. By Martin I. Wilbert, Technical Assistant, Hygienic Laboratory, United States Public Health Service.

The number of this reprint is 330, and may be obtained from the Government Printing Office for 20 cents. This publication is a valuable and convenient reference book of all narcotic and poison laws and therefore of particular interest to all branches of the drug trade.

Besides the laws and regulations there is much instructive commentary matter, and a very complete index to subjects is included.

AMERICAN TRAINING FOR FRENCH COMMERCIAL STUDENTS.*

It is generally recognized in both France and the United States that one of the greatest needs, in the development of foreign trade, is that of providing commercial education which not only shall be sound pedagogically, but in which emphasis shall be placed upon practical usefulness. With a view to discussing, in a preliminary way, the possibility of devising a practicable scheme for the interchange of students of commerce between France and the United States, I last week called a meeting of persons (both Frenchmen and Americans) interested in the subject of commercial education. Among those present were the Paris representatives of some of the largest exporting and importing firms of the United States and the representatives of several French organizations of manufacturers and merchants and of the University of Paris and other educational institutions.

It was suggested at the conference that, while the two countries now exchange professors, possibly greater benefits would accrue from an exchange of students who intend to make foreign trade their career. A committee representing both countries was appointed to draw up a tentative plan; and this committee desires most earnestly to be placed in touch with American manufacturers or dealers actively interested in this question, and especially with trade organizations likely to give serious attention to the general subject of training young men along practical lines in connection with the promotion of foreign trade. For the present the chairman of the committee is the Commercial Attaché of the United States (address: 36 Avenue de l'Opera) at Paris.

* Commercial Attaché C. W. A. Veditz, Paris, France, July 14, in *Commerce Reports.*

TYPOGRAPHY AND ORTHOGRAPHY IN THE JOURNAL, WITH A FEW SUGGESTIONS FOR AUTHORS.

In presenting the following data the contention is, that not all errors in the pages of printed literature are chargeable to the authors, the printer or even the editor. The purpose then is not for criticism or pointing out deficiencies, but to be helpful. Everyone will admit the lack of uniformity of style in magazines. While no pretentions are made that this study will eliminate all imperfections in this JOURNAL, there should follow a degree of improvement which will make the compilation worth the time and space given to the presentation. It is the intention, from time to time, to continue this theme, and both constructive criticism and suggestions are invited from members, authors and the pharmaceutical press. The first article will deal with many subjects and hence be more or less superficial; this has largely been arranged for our own convenient reference in marking copy.—The Editor.

Originality and accuracy are high qualities of acceptable papers. Simplicity of style and brevity assure more readers for an author than an unnecessarily long contribution, written in obscure style. The thoughts and conclusions of an author should be explicitly presented, for he cannot follow his messages into the homes of the readers.

The name of the author of a paper should be written as he desires to have it appear in print. Special attention should be given to the spelling of proper names.

The article should preferably be typewritten, double space between lines, a wide margin along both sides of the writing. An abstract may be sent with the contribution. When written for one of the Sections of the American Pharmaceutical Association, an abstract should invariably accompany the paper. Another recommendation is to complete the paper with the expressed conclusions of the author, or a summary. The aim of writing is to give information and everything that contributes thereto enhances the value of the effort.

Credit for previous printing of an article or information as to its reading or presentation should be given in a footnote, the cross reference for which should be * following the title. All other footnotes should be numbered consecutively throughout the article, beginning with one. When a number of references are supplied they should be placed at the end of the article under the head "References," or "Bibliography."

If the article has been printed before, credit should be given to the periodicals in which it originally or subsequently appeared. The volume number of all periodicals should be expressed in Roman numerals. A uniform system of abbreviation for publications should be followed. (We are now preparing a list and this will appear in a succeeding issue.) The names of all periodicals should be in italics, except the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, which should always be in caps. and small caps.

A drawing may be used where it will serve to make clearer the author's meaning or will replace a long explanation. For such drawing India ink should be used. The submitted drawing should be at least one and one-half times as large as the reproduction. Tables should be avoided when it is possible to give the same information, in less space, in the text.

Within certain limitations the simplified spelling of words is preferred, as *e* for *æ* in such words as anesthesia, hemorrhage; *e* for *œ*, as in esophagus; *er* not *re*, as in meter, center; role not rôle; distil, not distill; fluidrachm, not fluiddrachm, but whiskey, not whisky, in conformity with the Government spelling of the word. English plurals should be used, as formulas, not formulæ. The orthography of the U. S. Pharmacopœia and National Formulary should be followed.

All words, phrases and sentences in foreign languages should be in italics. Names of new compounds should be spelled out in full and underscored (underscoring indicates italics). When letters are used as mathematical symbols they should be in italics.

Weights and measures should be expressed in terms of the metric system, whenever practicable. All periods of time should be spelled out, so as to be readily distinguished from weights or measures, which should be expressed in numerals. A sentence should not

commence with Arabic numerals. Do not use an apostrophe after the word apothecaries when writing apothecaries weight or measure.

All temperature should be expressed in the Centigrade scale, and if no scale is mentioned Centigrade degrees will be understood. Do not spell out the word degree, but use the symbol, °.

The terms mil and mils should be used, so far as practicable, instead of cubic centimeter or the abbreviation Cc. Chemists will likely continue to employ the latter and, therefore, unless it be in pharmaceutical formulas, no change, from the one term to the other, will be made. A few abbreviations are here given that appear in articles of the JOURNAL:

Cc.	cubic centimeter.
cm.	centimeter.
Gm.	gramme and grammes.
Kg.	kilogramme.
M.	meter.
L.	liter.
N	normal solution.
$\frac{N}{50}$	fiftieth-normal solution.
sp. gr.	specific gravity.
$[a]_D$	specific rotation.
Kw.	kilowatt.

All Latin titles of preparations should be capitalized, but English titles, lower case, except when the official preparation is specifically referred to, and also in discussions of preparations, when the title is of prime importance, as, for instance, in articles now appearing on the Pharmacopœia and National Formulary. Synonyms are not capitalized.

Excepting in cases where the words president, secretary, etc., are used as part of a name or instead of a full name, they should be in lower case, as President John Jones called the meeting to order; the President delivered an address; but the following officers were elected: John Jones, president; William Brown, vice-president, etc. Names of special committees should be capitalized.

When the word association is written instead of the full title and refers to a particular body, it should be capitalized; so also pharmacopœia, when implying a reference to that of a certain country. Capitalize the names of all college and university degrees, as Master of Pharmacy. Words like state, south, etc., are capitalized only when they are substituted for the name of a particular state or section under discussion. When such words as bill, law, etc., form part of the name, they should be capitalized, as Harrison Law, Stephens-Ashurst Bill. We realize that most publications set law and bill in lower case, but the application of such rule would, in our opinion, put down pharmacopœia, when preceded by United States, capitalizing United States only. The modern idea is to print in lower case whenever possible and whenever there is doubt. This, beyond question, makes for a better appearing printed page, but we prefer not to go to the extreme of such practice.

Chemical symbols should not be used for abbreviating purposes solely, in the text, but may be given when the purpose, for example, is to indicate content of the element or elements in a formula or compound, as, Syrup Ferrous Iodide should contain not less than 4.75 percent nor more than 5.25 percent of FeI_2. If the symbol of a chemical compound has to be separated at the end of a line, a hyphen should never be used to show the break, as it is apt to be understood as a dash. Endeavor not to split a chemical symbol.

Except when an official name supplies the authority, hydroxyl derivatives of hydrocarbons should end in *ol*, as resorcinol; glycerin, official designation, may also be given glycerol. Benzene and toluene are preferable to benzol and toluol. The term hydroxide should be used for a compound with OH and hydrate for one with H_2O; pharmacopœial authority will, however, change the application in some instances.

The ending *ine* should be used for basic substances *only* (distinction for alkaloids); *in* for glycerides, glucosides, bitter principles, proteins, etc.; thus, atropine and aniline; gelatin, ouabin, cornin and albumin. In translations it should be remembered that the French use *ine* for both basic and neutral substances, while the Germans employ *in* for the same designations. German names of hydrocarbons and ending in *an* should be translated *ane*.

JOURNAL ANNOUNCEMENTS.

Subscriptions: Annual subscriptions in advance, including postage: United States and Mexico, $4.00; Canada, $4.35; foreign countries, $4.50. Single copies, 35 cents. Remittances should be made payable to Treasurer H. M. Whelpley, but mailed to JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, 253 Bourse Building, Philadelphia, Pa. Under the rules of the Post Office the JOURNAL can be regularly mailed only to bona-fide paid subscribers.

Requests for Back and Missing Numbers: Requests for back and missing numbers should be sent to the Editor. Claims will not be allowed if sufficient notice has not been given of change of address, and in no case if received later than sixty days from date of issue. Notice of change of address should give old and new address.

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Further information will gladly be furnished by any of the officers of the Association and members.

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